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The **RUBBER AGE**

VOL. 48, No. 6 **MARCH, 1941**

Rubbers, Natural and Synthetic

By J. W. SCHADE

Director of Research,
B. F. Goodrich Company,
Akron, Ohio

ALTHOUGH at the time preparation of this discussion was first contemplated considerable information had been published concerning the composition and properties of certain synthetic rubber-like materials, no article had appeared summarizing the work in this field and comparing the properties of the various kinds of synthetics. The Bureau of Standards, U. S. Department of Commerce, has since issued its Circular C427 entitled "Synthetic Rubbers, A Review of Their Compositions, Properties and Uses," by Lawrence A. Wood. This excellent summary, which contains 228 references to original sources, is worthy of study by anyone interested in the potential uses of any of these materials.

Recent as this publication is, it is nevertheless already inadequate to supply data concerning synthetics which have been announced within the past few months. There is no information in the circular about Ameripol rubbers *(1)*, Butyl rubber *(2)* nor Chemigum *(3)*. Furthermore, new varieties of neoprene and Thiokol have been recently developed. The relative values of these newer synthetics for commercial applications have yet to be ascertained.

Note: This paper was presented at the annual meeting of the Institute of Aeronautical Sciences, held at Columbia University, in New York City, on January 30, 1941.

(1) Product of the B. F. Goodrich Co., Akron, Ohio. To be marketed as Hycar rubber by the Hydrocarbon Chemical & Rubber Co., Akron, Ohio.

(2) Product of the Standard Oil Development Co., Linden, N. J. See *Ind. Eng. Chem.*, Vol. 32, pp. 1283-92 (1940).

(3) Product of the Goodyear Tire & Rubber Co., Akron, Ohio. See *I.R.W.*, Vol. 103, No. 1, p. 44 (1940).

What Are Rubbers?

Rubber technologists are not unanimous in agreement as to what properties a synthetic material must possess to qualify as a rubber. Many synthetic substances, such as synthetic indigo or synthetic methanol, are chemically identical to those of the same name derived from vegetable origins. In contrast, all of the commercially available synthetic materials classified in this discussion as rubbers are distinctly different in composition from that of the natural product. Such valuable properties as strength, stretchiness and elasticity are not determined by the kind of chemical elements of which the rubbers are composed but rather by the arrangement of the atoms in the molecules, by the size of the molecules and by the structures produced as the result of vulcanization processes. Here the classification is based solely on physical properties and all these synthetics resemble natural rubber in some of the physical characteristics on which its wide usefulness depends.

The meaning of the word rubber has changed. It no longer signifies a particular hydrocarbon material but has been widely adopted to characterize a class of substances similar physically to natural rubber regardless of their chemical composition. In order to qualify as a rubber a material should stretch readily to a considerable degree and, after release, retract forcefully and quickly; but no specific criteria have been generally accepted limiting the values for these properties.

Varieties of Synthetic Rubber

In his circular Mr. Wood lists twenty-nine products under the heading "Varieties of Synthetic Rubber." Some of these, notably Methyl Rubber made in Germany during the World War of 1914-1918, are not now obtainable commercially. The list also includes essentially identical products under different names. The synthetics which recently have been or are now of commercial interest in this country are of five types:

(1) Polymers of chloroprene	Neoprenes
(2) Reaction products of aliphatic dihalides with alkali polysulfides	Thiokols
(3) Co-polymers of butadiene with other polymerizable compounds	Perbunan Buna S Ameripols Hycars Chemigum
(4) Plasticized polymers of vinyl chloride	Koroseal
(5) Polymers of isobutylene	Vistanex

All Rubbers Consist of Long Molecules

As has been stated, all of these differ chemically from natural rubber. It was postulated many years ago that the molecules of natural rubber are made up of a great number of C_5H_8 groups derivable from isoprene by a shift of chemical linkages. Chart I shows the structure of isoprene and of the hydrocarbon of natural rubber.

Calculations indicate that rubber contains from 200 to 4400 C_5H_8 units per molecule varying with preliminary treatment of the hydrocarbon and the method of measuring its molecular weight. How the long chains of carbon atoms are built up by growing plants is not definitely known; but similar chains of carbon atoms or atoms of carbon interspersed with other elements can be produced by artificial means through polymerization of relatively simple molecules. Chemical polymerization may be likened to the formation of a metal chain, the individual links representing the simple molecules, the completed chain the polymer. The links may be all alike or links of different materials may be joined in the same chain. Natural rubber may be considered as a polymer of isoprene of high, though not uniform, molecular weight.

It should be noted, however, that no polymer of isoprene yet made artificially has approached the quality of rubber closely enough to be suitable for practical use. Similarly the molecules of synthetic rubbers are chain polymers of great length. It has been ascertained that the size of the polymers, *i.e.* the length of the chains, and the degree of cross-linkage between them which occurs to some extent during polymerization determine the physical properties of the materials. These factors are controlled by regulation of temperatures and by the kind and amount of catalysts used in the polymerization process. Such attributes as resistance to swelling by solvents and electrical properties are largely dependent on the chemical composition but strength, stretchiness and elasticity are determined primarily by structure.

Chemical Structure of Rubbers

For a clearer understanding of their similarities and of the differences between natural rubber and the five classes of synthetics Chart II has been prepared.

The co-polymers of the third group are not mixtures of separate polymers of the two ingredients. The polymer chains are made up of units of the two simple molecules chemically united.

Changes Produced by Vulcanization

In its unvulcanized state natural rubber is more or less plastic and when suitably prepared can be readily sheeted, extruded in tubular or other shapes, squeezed into the meshes of textile fabrics or spread in solution on their surfaces. These properties, important for the fabrication of articles, are possessed in varying degrees by all the synthetic materials here classified as rubbers. Vulcanization changes natural rubber from a plastic substance, soluble in hydrocarbon solvents and susceptible to marked physical and chemical alteration within the range of ordinary weather temperatures, to a new material highly elastic, insoluble (though swollen) in hydrocarbon solvents and relatively insensitive to change over a considerable temperature range. Similar changes may be induced by vulcanization in most of the synthetic rubbers.

Mechanism of Vulcanization

From the column headed "Unit of Polymer" it is evident that all formulas except those opposite "Vinyl Chloride" and "Isobutylene" contain doubly bonded atoms. Vulcanization usually involves breakage of one bond at some of these points and either direct chemical union with a similar bond of an adjacent chain (as in the case of neoprene) or union indirectly through a vulcanizing agent such as sulfur (as with rubber, the Bunas, Ameripols and Butyl rubbers). It is obvious why the polymers of vinyl chloride and isobutylene, which contain no double bonds, will not vulcanize in this manner. Within certain temperature limits, however, these unvulcanized synthetics manifest some of the important properties of vulcanized rubber and may logically be included in the rubber category. In soft rubber compositions cross-bonding during vulcanization occurs at relatively few points.

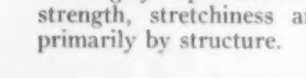
By incorporation of large proportions of sulfur with natural rubber and vulcanizing at high temperatures for relatively long periods all of the double bonds may be reacted and hard rubber (ebonite) produced. The Bunas and Ameripols are like natural rubber in this respect but neither neoprene nor Thiokol vulcanize to the hard rubber state. Hard rubbers of Perbunan or Ameripol are superior to that made from natural rubber in resisting flow under load at high temperatures.

New Synthetics Expected

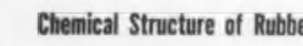
Investigations of the co-polymer field, though intensively pursued for some years past, have by no

CHART I

Isoprene

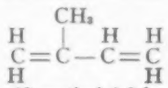
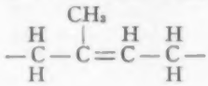
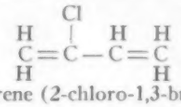
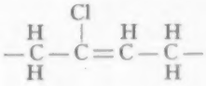
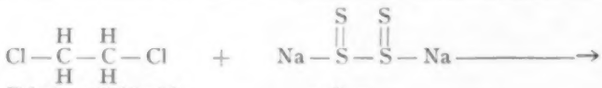
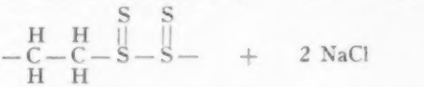
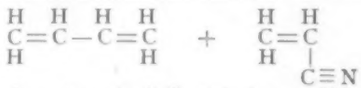
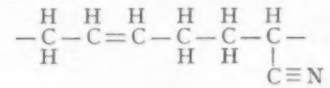
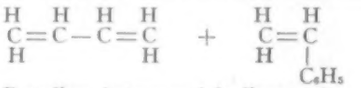
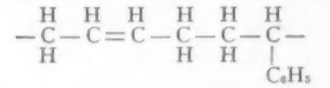
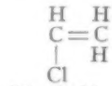
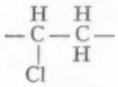
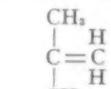
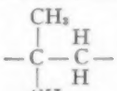


Unit of which the rubber hydrocarbon is constructed



Rubber hydrocarbon

CHART II

Basic Materials (Monomers)	Unit of Polymer	Products
 Isoprene (2-methyl-1,3-butadiene)		Rubber
 Chloroprene (2-chloro-1,3-butadiene)		Neoprene
 Ethylene dichloride (1,2-dichloroethane); sodium tetrasulfide		Thiokol A
 Butadiene+acrylonitrile (vinyl cynanide)		Buna N* Perbunan Perbunan Extra
 Butadiene+styrene (vinylbenzene)		Buna S
 Vinyl chloride		The *Plasticized* Polymer is Koroseal
 Isobutene (2-methyl-1-propene)		Vistanex

(*) Butyl rubber, reported to be "a co-polymer of olefins with small amounts of diolefins," is similar to the synthetics of this class.

means covered all possible combinations. It is reasonable to expect that continued research may within a few years disclose several new synthetic rubbers made from as yet untried combinations, each possessing some desirable characteristic to a degree as yet unobtained. If this expectation is realized the usefulness of rubber-like materials, already extended by synthetics, will spread far beyond the limits imposed by the properties of materials now available.

Properties of All Rubbers May be Modified

The number of uses of natural rubber unblended with other materials is decidedly limited. For one hundred years the rubber industry has been seeking improved methods of modifying rubber in order to make it more resistant to abrasive wear, oil, heat or other deteriorating materials or forces affecting serviceability. It has been necessary to produce compositions of different colors and of various degrees of hardness or rigidity—in fact, to modify all the properties exhibited by vulcanizates containing only rubber and sulfur. Such alterations are achieved by mixing with rubber before vulcanization selected kinds and amounts of other materials. These compounding ingredients are of great variety,—finely divided pigments, softeners such as oils or tars, fibrous materials, vulcanization accelerators, or age resisters.

During this period in designing their products manufacturers of rubber goods have learned, also, various ways of combining the advantages of rubber compositions with desirable properties of other materials such as wood, metals or textile fabrics. Like expedients are now being followed in modifying synthetic rubbers and designing articles in which they are used. Some of the modifying materials used with natural rubber produce similar effects with synthetic, but it has been found that better results are sometimes obtained from materials not formerly adopted for rubber compounding. Just as study and experiment have disclosed ways of improving in certain respects the properties of natural rubber, it is to be expected similar important improvements will be made in compounding technique with synthetics.

Serviceability of Rubbers Constantly Improved

To meet the many requirements imposed by a wide diversity of uses hundreds of rubber compositions have been developed. For a specific service those are selected whose properties are best suited to meet the requirements. Compositions are frequently improved but, no matter how great the improvement, demands for products to withstand more severe conditions never cease. Conveyor belts, for example, originally required to carry small aggregates at ordinary temperatures, must now withstand the shock of large masses dropped upon them and, at times, must transport materials at temperatures only slightly below red heat. Belts capable of withstanding this severe punishment are now available. Such developments require the invention not only of new rubber compositions but of improved fabrics and necessitate new designs for many articles.

The improvement of pneumatic tires and inner tubes is an excellent example of this response to demands for better quality and extension of the field of application. The increased wear of treads on passenger cars from 3,000 miles at slow speeds to 15,000 miles and more at the high speeds of modern cars (improvement in tread wear resistance during the past ten years has averaged 10% a year), the design of tires capable of resisting temperatures of 220° F. generated in high speed bus service, the construction of tires each capable of carrying 20 tons for heavy haulage, the improvement of inner tubes so that they no longer tear to pieces when a tire is run flat after sudden deflation until the car is stopped—all these illustrate the sort of progress made in the compounding of rubber and the design of products. The rubber industry has not been static and there is no indication that the limit of improvement will soon be reached.

Assembled Before Vulcanization

Rubber differs from many materials in that, with few exceptions, vulcanized rubber is not sold in sheets, tubes or other standard forms to be cut to size or shape to serve as unit parts for fabrication of structures, machines or apparatus. A transmission belt, for example, is not made by plying together sheets of vulcanized rubber and lengths of cotton duck and cementing the various parts together nor are vibration dampeners made by cementing or riveting a block of rubber between appropriately shaped steel plates. The various parts of rubber articles are assembled before the rubber is vulcanized and these are welded together during the vulcanization process which develops the desirable properties of the rubber portions.

Rubber Compositions Are of Great Variety

Inasmuch as all rubbers are greatly modified by compounding and their compositions are usually combined with other structural materials to render the rubbers useful for a great variety of services, it is evident that no table of properties can be compiled representative of any vulcanized rubber as a specific material. Values for load deflection relations, tensile strength and elongation at rupture, flow (hot or cold), specific gravity, thermal or electrical conductivity, thermal expansion, hardness and so on vary with each change of composition and sometimes with the degree of vulcanization.

In comparing the properties of compositions of several rubbers each of which may be varied so widely one cannot be very specific. Certain general comparisons may be made, however, which will be of value to those who are interested in applications of rubbers for specific uses. Chart III tabulates the relative merits of rubber and the synthetics which have been used commercially in this country. Vistanex is omitted because its applications as a substitute for natural rubber are not important, although it is used in mixtures with natural rubber and for electrical insulation to some extent.

Special Values of Different Rubbers

The mechanical properties of compositions of natural rubber are not surpassed to any marked extent by those of synthetic rubber stocks. For this reason, unless their cost can be reduced sufficiently to be competitive, it is probable that synthetic rubber will not replace the natural product in articles which depend for utility on such properties alone. It frequently happens, however, that in service rubber must be subjected to influences which rapidly impair its mechanical excellence. Contact with oil may be unavoidable or exposure to bright sunlight or to high temperature. In such cases compositions of synthetics or of mixtures of synthetics with natural rubber must be used. Occasionally some one material so far surpasses all others that it alone may be used successfully.

For example, no synthetic has yet been found to equal natural rubber in resiliency or extensibility. Golf balls, made by winding rubber thread under tension, and stationers' bands are markedly superior to similar products made of synthetic materials. Also, linings for metal tanks to resist the action of nitric-hydrofluoric acid mixtures used for pickling stainless steel or of chromic acid plating solutions are made of Koroseal because of the outstanding superiority of this material in resisting these powerful oxidizing solutions. For tubes of hose to conduct lacquer solvents and thinners Thiokol is the most resistant of any of the synthetics which have yet appeared.

Oil Resistance and Its Practical Applications

The predominant virtue of synthetics over natural rubber is their resistance to oil and organic solvents. This fact has directed their first use to those types of service where the flexibility of rubber was needed but, because of the action of such liquids, compositions of natural rubber could not be satisfactorily applied. A few of these may be mentioned by way of illustration. The superiority of rubber inking rollers on newsprint presses over the older glue-glycerine compositions indicated their possible extension to other types of printing. It was found, however, that rubber which withstood the action of newsprint inks containing no drying oils was entirely unsuited for use with inks composed of these oils containing manganese or cobalt driers. Rollers of synthetic rubbers, however, not only resist the action of oils and driers but do not soften when heated as the glue-glycerine rollers do. This has led to their adoption for a new printing process in which the ink, a solid at room temperatures, must be melted by heated rollers on the press. It does not require oxidation but sets by chilling. This is the process used in printing the new paper, PM.

Water-lubricated rubber bearings are commonly used

CHART III

E = Excellent; G = Good; F = Fair; P = Poor

Property	Rubber	Neoprene	Thiokol	Koroseal	Perbunan	Oil Resistant Ameripol
Abrasion and tear resistance	E	G	P	E, if heat is not generated	E	E
Adhesion to metals	E	E	F	F	E	E
Aging in storage	E	E	E	E	E	E
Chemical resistance:						
Oxidizing solutions	P	P	P	E	P	P
Ozone	P	E	E	E	F	F
Solutions of salts, alkalies and acids	G	G	G	G	G	G
Color range	E	G	P	E	F	G
Resistance to cutting	G	G	P	E	G	G
Resistance to diffusion of gases	F	G	E	E	G	G
Elasticity and rebound	E	G	P	F	G	F
Electrical properties:						
Conductivity	F	F	F	F	F	F
Resistance to corona cracking	P	E	E	E	P	P
Dielectric strength	E	F	F	E	F	F
Flame resistance	P	G	P	E	P	P
Resistance to flex-cracking	G	G	F	E	G	G
Resistance to flow:						
Cold	E	G	P	F	E	E
Hot	E	F	P	P	E	E
Hardness range–durometer A	20–100	10–90	20–80	10–100	10–100	10–100
Low heat generation through hysteresis	E	F	F	—	F	F
Freedom from odor	G	F	P	E	F	F
Resistance to swelling in						
Chlorinated or aromatic solvents	P	P	G	Shrinks because of extraction of plasticizer	P	F
Lacquer solvents	P	P	G		P	F
Mineral oil or gasoline	P	G	E		G to E	E
Water	F	G	—	E	E	E
Resistance to deterioration by mineral oil	P	E	F	G	E	E
Specific gravity of basic material	0.93	1.25	1.35	Average plasticizer content 1.30	0.98	1.00
Range of stretchability	E	G	F	F	G	G
Resistance to checking in sunlight	F	E	E	E	F	G
Stability of properties with change of temperature:						
Cold	E	F	E	F	G	G
Hot	G	E	P	P	E	E

for the outboard bearings of propeller shafts on vessels plying in silt-bearing waters. The rubber is deformed by any particles of sand which enter between it and the metal shaft and these particles travel along the shaft and are expelled without scoring the metal. In exceedingly muddy water such as is produced by the cutter heads of dredges rubber bearings have yielded extraordinarily long service. When, however, bearings of this sort were used on vessels at Maracaibo, Venezuela, where the surface of the water was covered with a film of oil from neighboring wells the rubber swelled and softened and the bearings soon failed. Substitution in the bearings of synthetic rubber compounds which are not swollen or deteriorated by oil overcame the difficulty.

Because of their resistance to swelling in gasoline, synthetics are replacing natural rubber in hose for dispensing this fuel. Here a change in the construction of the hose has been made. The older type in which a layer of rubber was sandwiched between an inner flexible metal tube and an outer jacket of tightly woven cotton strands is being displaced by hose of conventional design in which the tube is made of a synthetic rubber composition. Similar superiority against the action of lubricating oils led to adoption of synthetics for hydraulic brake hose for use with fluids containing mineral oil, though natural rubber has proved adequate for use with fluids of the glycerol type.

It should be noted that different grades of gasoline and lubricating oils affect synthetics differently. Gasolines containing benzol, for example, are more severe in their action than aliphatic hydrocarbons alone. Nor are all lubricating oils designated by the same S.A.E. number alike in their action *(4)*. Furthermore, the degree of swelling is not always indicative of the value of a compound. Some which swell but slightly become weak and inextensible in contact with oils.

Resistance to Sunlight

Another superiority of certain synthetics lies in their resistance to checking in sunlight. This fact led to the adoption of neoprene in a surface coating for rubber airplane de-icers exposed at times to bright sunlight which induced checking and cracking. Because the higher specific gravity of neoprene would increase the weight and because it stiffens at higher temperature it was undesirable to replace rubber entirely throughout the structure. It is interesting, too, that by compounding the neoprene with graphite, sufficient conductivity was obtained to prevent the potential of static charges built up during flight from becoming sufficiently high to cause discharge through the de-icer structure, which had often occurred before neoprene coatings were

(4) *Ind. Eng. Chem.*, Vol. 32, pp. 1069-72 (1940).

adopted. The electrical conductivity and resistance to gasoline of compounds of synthetic rubbers has made practical their use as hose nozzles at filling stations where the flexibility and softness of rubber have long been recognized advantages over metal for this purpose.

Two other respects in which synthetics surpass natural rubber are their resistance to swelling by water, especially under heat and pressure, and their greater resistance to diffusion of gases.

Combined Characteristics Often Decide Choice of Materials

In many cases no one property determines the selection of a material for service. A combination of several properties must be secured and technologists who design the various compositions must select those materials which yield the best all-round characteristics for the purpose. Good resistance to abrasion is obtainable from most of the synthetics under certain conditions of service. Shoe soles of Koroseal will outwear rubber compounds of the same hardness; but if the service were such that the material became heated as the result of friction Koroseal would not be considered. If again, to the demand for good resistance to abrasive wear is added the requirement that the composition must withstand heating under rapidly repeated compressions natural rubber would be selected, but if oil resistance is a further requisite the technologist will abandon rubber entirely and, necessarily accepting some heat generation, pick one of the synthetics.

Unfortunately, not all of the synthetics which exhibit excellent resistance to the action of oil possess satisfactory characteristics for use as electrical insulation. Of the oil resistant varieties Koroseal has found the widest use in the electrical industry as insulation or as oil-resistant sheathing on wire and cables. In these constructions, the fact that Koroseal does not require vulcanization is a decided advantage.

Specifications for Rubber Compounds

In order to be certain of obtaining articles suitable for their needs purchasers of rubber goods often specify certain features of construction or composition which they believe will insure the desired qualities. With this in view some have drawn specifications designating that the compound shall be made of a particular synthetic rubber. This practice is undesirable for at least two reasons. In the first place it prevents the manufacturer from utilizing any other material even though it may furnish to the consumer goods of better quality or lower cost or both. In fact, improvement of quality, especially of articles built up of various parts, may be largely dependent on the processing properties of the synthetics—a feature about which the consumer usually has no information. Second, it hinders the commercial development of new synthetics by reducing the amount which might otherwise be used.

Costs of these materials are greatly influenced by the volume of production. If a new synthetic, no matter how good, will not be accepted, its use cannot increase as it might in a free market with competition based on quality alone. The practice of specifying acceptance tests of such character as to insure suitability for the desired purpose and leaving to the manufacturer the choice of the materials from which he can best secure the necessary properties must inevitably result in the purchaser's obtaining higher quality and better value for his expenditure. No chemical manufacturer who produces synthetic rubbers is unbiased in promoting sales of his product. Even though he knows that for certain purposes a competitive material is preferable, he does not recommend its use.

Technologists in rubber manufacturing establishments, on the other hand, utilize all kinds of synthetics. They are interested only in obtaining the best materials available. They are constantly making comparisons among the commercial synthetics and adopting each for specific types of service on the basis of their merits. Their experience and judgment should be of value to engineers or inventors who need to apply rubber compositions for attaining certain objectives. Specifications should permit them to choose the materials best suited to each type of service.

Conclusion

The development of synthetic rubbers is a new and expanding field. Compositions of these synthetics offer no marked advantage over those of natural rubber in their mechanical properties but are far superior in resisting certain deteriorating influences often encountered in service. The earliest applications of synthetic rubbers were based on their outstanding resistance to sunlight, gasoline and oils. Occasionally only one material is satisfactory for a particular service. More often the desired results may be obtained from two or more of them. Superiority has been found in synthetics over natural rubber in:

(1) Resistance to swelling and deterioration in contact with oils, organic solvents and water.
(2) Resistance to cracking in sunlight.
(3) Resistance to deterioration by heat.
(4) Resistance to powerful oxidizing agents.
(5) Resistance to diffusion of gases.

Rubber still exhibits superiority to all the synthetics now available in:

(1) Elasticity and rebound
(2) Low-heat generation through hysteresis.
(3) Extensibility.
(4) Resistance to stiffening at low temperatures.

This is the picture today. How it will be changed within the next few years or even the next few months no one can safely predict.

There's Still Time for Advertising Copy for the RUBBER RED BOOK

● If you haven't already sent in your order for space in the big 1941 edition we suggest you do it today. It's the one book in which every supplier should be represented with dominating advertising space.

Rubber Division, A.C.S., Meets in St. Louis, Mo., on April 10th and 11th

AN ACTIVE program has been arranged for the meeting of the Division of Rubber Chemistry, A.C.S., which will be held in St. Louis, Mo., on Thursday and Friday, April 10 and 11, in conjunction with the 101st Meeting of the Society, which gets under way on Monday, April 7. The General Meeting will be held on Monday, April 7, at 2:00 P.M. in the Opera House of the Municipal Auditorium. The annual subscription dinner will be held on Wednesday, April 9, at the Hotel Jefferson.

The program of the Rubber Division includes a Symposium on "New Developments in the Processing of Rubber," which will feature four papers and discussion, the presentation of ten technical papers, a report from the Crude Rubber Committee, a business meeting, and the usual divisional dinner. Although headquarters for the Division will be maintained at the Hotel Mayfair, as originally planned, all sessions will be held at the Hotel Statler, located only one block away. This change was made necessary because at this writing there were already over 200 reservations on file, as compared with the handful in 1920 and the ninety in 1928 when the Division met in St. Louis, and it was felt that the accommodations at the Mayfair would be inadequate.

The Division's program will start on Thursday afternoon, April 10, at 1:30 P.M., when the Symposium will be presented. An introduction will be made by Dr. R. H. Gerke, of the General Laboratories, U. S. Rubber Co., Passaic, N. J., Chairman of the Division. The report of the Crude Rubber Committee will lead off the session on Friday morning, April 11, after which four technical papers will be given. The business meeting will be held before this morning session is concluded. The afternoon session on Friday will be given over completely to technical papers.

Banquet to Feature Entertainment

The banquet of the Rubber Division will be held on Thursday evening, April 10, in the ballroom of the Hotel Statler. According to F. W. Frerichs, chief chemist of the Cupples Co., who is chairman of the committee in charge of arrangements, dinner will be followed by a varied and entertaining floor show attuned to the tempo of the gathering. This entertainment is scheduled to last 80 or 90 minutes, after which there will be music until midnight for those members and guests who desire to dance. Partners will be provided for the dancing period.

Abstracts of the papers, arranged in order of their scheduled presentation, together with the authors and their connections, follow herewith:

Program of the
DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY
Hotel Statler—St. Louis, Missouri
April 10-11, 1941

Thursday Afternoon—April 10

1:30-4:00 P.M.—Symposium on "New Developments in the Processing of Rubber." Introduction by Dr. R. H. Gerke.

Thursday Evening—April 10

6:30 P.M.—Banquet, Ballroom, Hotel Statler, Entertainment and Dancing.

Friday Morning—April 11

9:00-9:25 A.M.—Report of the Crude Rubber Committee, by George A. Sackett, Chairman.
9:30-11:25 A.M.—Technical Session.
11:30-12:00 Noon—Business Meeting.

Friday Afternoon—April 11

1:30-4:00 P.M.—Technical Session.

ABSTRACTS OF PAPERS

Thursday Afternoon—April 10

Symposium on New Developments in the Processing of Rubber

1:30 P.M.—Introduction. ***R. H. Gerke, Chairman, Division of Rubber Chemistry, A.C.S.***

1:45 P.M.—Cold Resistance of Synthetic Rubber. ***W. J. McCortney (Chrysler Corporation, Detroit, Michigan).***

An accurate method for determining the cold resistance of rubber has been developed. This method is used to check the cold resistance of various synthetic rubbers, various compounds of these rubbers, and effects of different methods of processing. All tests are run at —40° C. The results show that small variations in processing and compounding show up greatly in stiffening characteristics at low temperatures.

2:30 P.M.—Injection Molding. ***H. W. Paine, M. L. Macht, and W. E. Rahm (DuPont Viscoloid Corporation, Arlington, N. J.).***

Injection molding is a process of forming articles by molding a powder, forcing it through a small orifice or gate into a cold, closed die, and ejecting it immediately. This method has decided advantages over compression and other older methods of molding. Lantern slides will be used to illustrate modern molding equipment and to indicate the advances incorporated in the new injection machines. A moving picture will illustrate the injection molding technique and articles made by the process will be displayed.

3:15 P.M.—Instrumentation in the Rubber Industry. ***C. P. Bosomworth (Firestone Tire & Rubber Company, Akron, Ohio).***

The rubber industry, like others, is eliminating the element of human variability by the introduction of machines equipped with accurate instruments for maintaining uniform quality. Instrumentation is playing an ever increasing role, particularly in rapid mixing and stock preparation in tubers and Banburys, in tire and tube curing, and in the correct shaping and size of extruded products. Maintaining accurate curing temperatures enables us to use superactive chemicals in compounding. Finished products can now be checked by x-rays, sound meters, and traction slip recorders. Instrumentation has come a long way, but many major problems are still with the rubber industry.

4:00 P.M.—Mechanical Developments in the Processing of Rubber. ***Andrew Hale (Farrel-Birmingham Co., Inc., Ansonia, Conn.).***

The mill room of the future will be a one-man mill room. Huge crackers, capable of taking entire frozen bales, will deliver warm and softened rubber direct to plasticators. Broken-down rubber will come forth in pellet form. Remote controls will feed compounding ingredients, rubber, and reclaim pellets from bins to automatic scales and also regulate the Banbury cycles. The rubber pellets will be pre-blended in unprecedented quantities. Sheeting mills will give way to screw-fed pelletizers which will receive direct charges from mixers and deliver mixed stock pellets, automatically cooled, to individual bins where each batch will await laboratory release and then proceed to mills for sulfuring and warming.

Friday Morning—April 11

9:00 A.M.—Report of Crude Rubber Committee. ***George A. Sackett, Chairman.***

9:30 A.M.—Relaxation Phenomena and Reversible Stress-Temperature Curves for Soft Rubber. ***Robert L. Anthony, Ralph H. Caston, and Eugene Guth (University of Notre Dame, South Bend, Ind.).***

An exhaustive study was made of the dependency of the stress upon time at constant extension for soft rubber with the objective of obtaining reversible stress-temperature curves. A large number of stress-time curves for elongation ranging from 3 to 400 per cent were taken at three different temperatures. At room temperature the relaxation was studied for longer than a month. All stress-time curves were observed to exhibit the same type of behavior and it was found that a good fit may be obtained by application of the equation

$$F = F_0 + F_1 e^{-t/\tau} - F_2 t$$

After several days the long run relaxation curves exhibited a linear relationship between stress and time. The slopes of these straight lines were quite small. The equation for the stress-time curves can be derived from the assumption that rubber behaves like a generalized Maxwell body.

After relaxation at the highest temperature employed, reversible stress-temperature curves were obtained by noting the change in force with decreasing and increasing temperatures, respectively. No thermal hysteresis was found and straight-line stress-temperature curves were obtained for all extensions between 3 and 400 per cent. At the two lowest extensions used (3 and 6 per cent) the stress was a linearly decreasing function of the absolute temperature. At 11 per cent extension the slope is positive. For higher extensions the slope of the straight lines increases with increasing extension. The negative slope at the lowest extensions is partly due to thermal expansion. The linear relationship for the stress-temperature curves proves the existence of a large elasticity due to change in entropy during the stretching process as predicted by the statistical theory of rubber elasticity. The relation of the present work to earlier work, especially that of Meyer and Ferri, will be discussed.

10:00 A.M.—Dynamic Properties of Rubber and Their Dependence on Pigment Loadings. ***S. D. Gehman, D. E. Woodford, and R. B. Stambaugh (Goodyear Tire & Rubber Company, Akron, Ohio.).***

A method of measuring dynamic properties is described wherein the rubber is driven by a loudspeaker arrangement of coil and magnetic field at a frequency of 60 cycles per second. The system is tuned to resonance by varying the mass of the vibrating system. The mass at resonance determines the dynamic modulus; the amplitude at resonance, the internal friction. Dynamic resilience and relative rates of heat generation can be calculated. The static modulus comparable to the dynamic value can be secured by passing a D.C. current through the coil.

Dynamic measurements are reported for a series of volume loadings of Superspectra black, channel black, Thermatomic black, zinc oxide, clay, and blanc fixe. The dynamic properties are specific for the different pigments. Curves are given showing the dependence on the pigment loadings of the dynamic modulus, ratio of dynamic to static modulus, internal friction, dynamic resilience, and calculated relative heat generation at constant force and at constant amplitude. Some curves showing the effect of cure are also included.

For the same volume loading, the dynamic modulus and internal friction increase in the order Superspectra, channel black, zinc oxide, clay, blanc fixe, Thermatomic, roughly in the order of particle size. The calculated dynamic resilience depends on the ratio of the modulus to the internal friction and improves in the order Superspectra, channel black, clay, Thermatomic, blanc fixe, zinc oxide. The dynamic modulus shows an almost linear relationship with the internal friction for different loadings of the same pigment.

Some tests were made of the effect of frequency in the range 20-150 cycles per second. The dynamic modulus is independent of the frequency in this range. It depends upon the amplitude, an effect which may be connected with the warming of the test piece due to the vibration. The amplitude at resonance for the same driving force is approximately constant at all frequencies.

The results show the wide range of dynamic properties obtainable with different pigments and bring out the general principles involved in their use for dynamic purposes.

10:30 A.M.—Hysteresis in the Crystallization of Stretched Vulcanized Rubber. II. X-Ray Studies of the Effects of Sulfur Content and Method of Curing. ***G. L. Clark and R. L. LeTourneau (University of Illinois, Urbana, Illinois), and J. M. Ball (R. T. Vanderbilt Co., New York City).***

Utilizing the same methods with considerable improvement which were utilized in the paper presented before the Rubber Division at the Cincinnati meeting of the American Chemical Society in April, 1940, results are now reported on a whole series of rubber samples in which the sulfur content of the original mixture varied from zero to 8 per cent; and also for a series of specimens in which the time and temperature of curing varied widely for a given percentage of sulfur used in vulcanization. The method consists essentially in stretching the rubber samples over fixed intervals of elongation and making an x-ray diffraction pattern under extremely carefully controlled and calibrated conditions at each stage in the elongation up to a maximum of 600 per cent where possible, followed by retraction over similar intervals again with an x-ray pattern at each stage.

These data then make possible the establishment of the percentage elongation at which crystallization first appears, a value which is highly characteristic of any individual sample; the maximum degree of crystallization reached at the maximum elongation of the specimen as measured by the intensity of diffraction interferences; the course and shape of the hysteresis loop which develops upon retraction; and the percentage elongation at which the last evidences of crystallization disappear.

Some details of the new improvements in technique are: patterns made in only five minutes, photometric measurement of intensities by a new Leeds & Northrup recording

microphotometer, and intensity measurement of the halo corresponding to the uncrystallized portion of the rubber molecules at each stage of elongation. This latter measurement permits a more accurate evaluation of the relative proportions under each condition of stress of crystallized versus disordered areas of the specimen, leading to a more careful experimental evaluation of theories of structure.

11:00 A.M.—Viscosity-Molecular Weight of Rubber. ***A. R. Kemp and H. Peters (Bell Telephone Laboratories, New York City).***

The Staudinger viscosity-molecular weight relationship has been critically examined and various procedures for fractionating and determining the molecular weight of rubber by the viscosity method have been studied.

Recommendations are made to employ the equation

$$M = \frac{\log\eta_r \cdot K_{cm}}{C}$$

based on the Arrhenius relation

$$\frac{\log\eta_r}{C} = K_c$$

which holds true within narrow limits provided the viscosity range is not too great. To improve reliability the concentrations of solute have been employed to give relative viscosities of 1.7 ± 0.3.

Depolymerized rubber has been fractionated and the viscosity-molecular weight constants K_m and K_{cm} have been determined on several fractions using both benzene and cyclohexane in the cryosopic measurements of molecular weight. These results are discussed in relation to Staudinger's work.

The effect of various solvents on viscosity of rubber solutions has been considered and the need for standardization on solvents and method of preparing the solution is emphasized. Chloroform has been selected as a good solvent for general use; however, no solvent has been found which will completely dissolve first quality plantation crepe or smoked sheet when protected against oxidation.

The chloroform-soluble portion of crepe constituting about 90 per cent has been separated into several polyprene fractions whose average molecular weights range from 12,000 to 260,000. Gutta percha and balata hydrocarbons have been fractionated and the average molecular weights of the separate fractions are practically the same as the original material.

Friday Afternoon—April 11

1:30 P.M.—Oxidation of Unvulcanized Rubber in Light. II. ***J. T. Blake and P. L. Bruce (Simplex Wire & Cable Company, Cambridge, Mass.).***

In the previous paper it was shown that the tackiness developed during the exposure of unvulcanized rubber to light is due to oxidation. It was shown also that the presence of small amounts of various organic materials affected the rate of development of tackiness to a marked extent. Some materials greatly increased the rate, while others inhibited almost completely the development of tackiness. Among the materials conspicuous in accelerating the appearance of tackiness in unvulcanized rubber were the so-called antioxidants.

There was no proof that the tackiness is proportional to the extent of oxidation and all results were qualitative, being based only on individual judgment. An apparatus has been developed for studying quantitatively this oxidation in the presence of light and at various temperatures. These quantitative experiments, in general, confirm the previously obtained results. Although the work is only of a preliminary nature it has been found that the absorption of oxygen is approximately linear with time. So-called antioxidants may accelerate the oxidation under these conditions. The interval between the milling of the rubber and the determination of its oxidation rate has an appreciable effect on the latter, presumably due to the formation of peroxides. The opaqueness of the sample, due to added materials, retards the rate of oxidation.

Some study has been made of the relative rates of oxidation in light and in the dark, both with and without catalytic materials. Oxidations have been carried out both in air and in oxygen. The rate of oxidation is retarded by materials not usually associated with the inhibiting of oxidation in rubber.

2:00 P.M.—A Study of Rates of Vulcanization: Presenting a New Method of Evaluating and Comparing Rates of Cure. ***John G. Harrison, Jr. (Vulcan Proofing Company, Brooklyn, N. Y.) and Paul D. Bowers (Firestone Tire & Rubber Co., Memphis, Tenn.).***

The method presents a means of comparing rates of vulcanization directly, rather than by a study of the resulting effect of cure upon the chemical composition and physical properties of rubber compounds. Essentially the method is a determination of the minimum time to cure thick blocks of rubber without porosity.

The success of the test depends upon removing variables and keeping the nature of the problem in mind. No absolute fixed set of test conditions are recommended but a description of the test as conducted is given. In its exact form the test will not compare extent of porosity at any given "undercure," but will determine if one stock will require more of a minimum curing time than another. The point of minimum cure to prevent porosity is very precise and can be duplicated to within ten or fifteen seconds.

It is shown that the use of this test enabled evaluation of the curing rate of a series of crude rubbers in the same order as the tensile determination recommended by the Crude Rubber Committee of the Division of Rubber Chemistry of the American Chemical Society. Evidence that there was a fairly definite amount of free sulfur above which porosity resulted in this type of stock is in line with the holdings of the hydrogen sulfide theory of vulcanization.

By this test and by conventional tests it is shown that milling of rubber stocks retards the rate of cure.

2:20 P.M.—The Surface Area of Commercial Carbon Blacks. ***W. R. Smith, F. S. Thornhill, and R. I. Bray (Godfrey L. Cabot, Inc., Boston, Mass.).***

The low temperature nitrogen adsorption isotherm technique, as developed by Emmett and Brunauer, presents a convenient method of determining the total surface area of very finely divided pigments. The method has been applied to a number of commercial carbon blacks. The areas obtained are in good agreement with those calculated from recent estimations of particle size. The surfaces vary from 15 M^2/gram for thermal decomposition blacks, to 100 M^2/gram for reinforcing channel blacks, and 850 M^2/gram for intense color blacks. While there is a very general correlation of surface area and rubber reinforcement, cases have been found where blacks with nearly identical surfaces vary widely in reinforcing ability. Studies have been made of the adsorptive activity per unit area from heat of adsorption measurements.

The analytical properties of these carbons have been examined in the light of their respective surface areas. There appears to be a linear relationship between these areas and iodine adsorption. Carbon blacks of a high volatile content possess a much larger surface than would be anticipated from their color value or "dark field count" diameters. The diphenyl guanidine adsorption shows no simple relation with adsorptive capacity or total surface of the black.

2:50 P.M.—Influence of Moisture Content of Carbon Black on the Properties of Rubber. ***Leonard H. Cohen and C. R. Johnson (Continental Carbon Co., New York City).***

The effect of variation in the moisture content of carbon black on properties of cured rubber, such as modulus, tensile, and abrasion resistance, and also on the extrusion time of an uncured rubber-black mixture has been studied. Extrusion time at 0.2% moisture is more than 30% greater than the time at 4% moisture. This effect is larger than is to be

expected on the basis of the decrease in carbon loading resulting from the increase in moisture content.

Results on several samples of carbon black are reported and water vapor adsorption isotherms are compared with the extrusion *vs.* moisture curves. The effect of moisture content on tensile, modulus, abrasion, aging, and extrusion of a tread stock has been studied. Tensile and modulus both tend to decrease as moisture content increases from 0.1 to 4%.

Modulus at 400% elongation decreases at the rate of about 70 pounds per 1% increase in moisture content of the carbon black. Other experiments show that the decrease in carbon loading corresponding to a 1% increase in moisture content of the carbon black causes a decrease in modulus of only 35 pounds. Likewise, the behavior of the tensile at optimum cure *vs.* moisture content curve can not be explained exclusively on the basis of variation in carbon loading.

By keeping the moisture content of a standard control black constant, the reproducibility of modulus and tensile results was appreciably increased. When no particular precautions were taken to control the moisture content of the black, average deviations from the mean value of modulus at 400% elongation and tensile at optimum cure for 17 tests on identical tread stocks are 75 and 105 pounds per square inch, respectively. When the moisture content was regulated at 3% ± 0.1% these deviations decreased to 50 and 40 pounds, respectively. Suggestions are made for equilibrating carbon black at constant humidity in order to avoid a possibly troublesome source of variation in rubber testing.

3:10 P.M.—Rapid Determination of the Specific Gravity of Plastic Materials. ***Henry F. Palmer and Warren E. Jones (Xylos Rubber Company, Akron, Ohio).***

The specific gravity of a plastic material is indicated directly by a machine as a result of the controlled compression of a known weight of sample. The specific gravity of vulcanized reclaimed rubber or rubber compounds may be determined in approximately one minute.

3:30 P.M.—The Determination of Zinc in Rubber Compounds: A New Internal Indicator Method. ***W. P. Tyler (B. F. Goodrich Co., Akron, Ohio).***

In view of the difficulties encountered with the uranyl acetate external indicator method for the determination of zinc in rubber ash by volumetric precipitation with ferrocyanide, an investigation was undertaken in order to find a more rapid and more accurate method.

In the course of the investigation it was found that if the sample contains silicates or lead, the usual ashing procedure leads to the formation of compounds with the zinc which are not decomposed by acid treatment, thus giving very low results. The best method found for destroying the rubber was oxidation with nitric acid, bromine, fuming nitric acid, and perchloric acid.

After the oxidation of the rubber, volumetric precipitation with ferrocyanide was successfully used in the presence of ferricyanide and an internal indicator. Diphenylbenzidine will not function properly under these conditions, but a lesser known indicator, p-ethoxy chrysoidine, proved to be very satisfactory when back titration was employed. The proper conditions were also found for the determination of zinc in the ash in the absence of silicates and lead using either of the above internal indicators.

It is not necessary to remove lead with hydrogen sulfide when the acid digestion method is used. Iron must be removed but no other ions commonly found in rubber compound ash will interfere. The average precision for routine analysis is ±1%. The average accuracy is better than 1% deviation from the true value. The method is capable of application to the determination of zinc in other organic and inorganic materials.

Production of Gas Masks by Goodyear at Akron

The illustrations above show gas masks under process of production in the Akron, Ohio, plant of the Goodyear Tire & Rubber Company. Hundreds of female workers are now employed in the production of a large order of these gas masks for the armed forces of the United States. They work in a special department set up by Goodyear for such production. Rubber is an important part of every gas mask.

Rubber Substitute as a Compounding Material

By O. B. CROWELL
Chief Chemist,
Viceroy Mfg. Co., Ltd.
West Toronto, Canada

RUBBER substitutes or factices are all solidified or partially solidified vegetable oil products, vegetable oil plus, or the reaction products of vegetable oil and sulfur, sulfur chloride or sulfur and organic accelerators.

Manufacture of Substitutes

Brown Substitute is made by heating selected vegetable oils or mixtures of oils in jacketed kettles with sulfur. By varying time, temperature and sulfur content, a wide range of substitutes can be produced. Broadly, high sulfur, high temperature and longer time, will yield the harder, drier varieties, while lower sulfur, lower temperature and shorter time yield softer products. The reaction between the oil and sulfur is an exothermic one and the sulfur is therefore usually added slowly.

After the predetermined material, time and temperature reaction cycle is complete, the contents of the kettle are run off into greased pans, cooled, and the resulting solidified cakes are cut up and packed or ground on small rubber mills, cooled thoroughly and packed in bags or barrels.

White Substitute is made by reacting selected vegetable oils with sulfur monochloride under predetermined conditions of time and temperature. The selection of oils is more limited in this case than for brown substitute because of the required color of the finished product. The reaction between vegetable oil and sulfur monochloride is strongly exothermic. The $S_2 Cl_2$ is introduced slowly and usually the reaction vessel is provided with refrigerating coils and/or means for blowing air through the contents. The vegetable oils are usually dehydrated for obvious reasons and the final step before discharging the contents of the vessel into cooling pans is to neutralize with small quantities of either hydrated lime or magnesium oxide or sodium bicarbonate.

The Amberexes *(1)* or Whitbros *(2)* are newer products and are presumably the reaction product of selected light colored vegetable oils with relatively low amounts of sulfur driven home by means of high powered organic accelerators and heating for relatively long times at relatively low temperatures.

Factex *(1)* or Dispersed Substitutes are still later products and have been developed for use in rubber latex compounds. Factex is partially vulcanized, fatty oil dispersed in water. Any of the dry or fully vulcanized rubber substitutes can be dispersed in water so that they can be used in a latex compound by well known means.

From inquiries recently made, most compounders select rubber substitutes from offerings made and check running deliveries of material by three or more of the following tests:

(a) Appearance, color, surface, bloom, etc.
(b) Hardness (Shore A durometer)
(c) Feel in hand, squeeze, fracture, etc.
(d) Per cent ash
(e) Per cent acetone extract
(f) Per cent alcoholic potash extract
(g) Compounding value in rubber formula

Material with over two or three per cent ash and material with added mineral oil are not good value unless the price quoted reflects the addition. The purchaser's endeavor should be to secure the most vulcanized vegetable oil possible per dollar.

There is considerable difference of opinion among compounders as to the value of rubber substitutes. Depending on factory equipment and kind and quality of rubber goods produced, there could be circumstances where substitute should not be on the list of ingredients, but there can also exist circumstances in which it would be practically impossible to produce goods if substitutes were not used, and used in large quantities. As an example of the first, one might cite automobile tire treads, and of the second, erasers.

Primary Function of Substitutes

Probably the one function of substitute that is most widely recognized by rubber technicians is that substitute-containing compounds are easy to run and it is easy to hold either calender or tuber gauges with such compounds. The best statement as to why, comes from a small booklet issued by the Stamford Rubber Supply Company in 1940: "All three classes of vulcanized oils have one unique property in common in that they are not affected by temperature below their point of decomposition. In rubber compounding this means that vulcanized oils are non-thermoplastic softeners and extenders which level off the change in plasticity of the rubber with change in temperature."

In a general sort of way the incorporation of increasing loads of rubber substitute, either white or

Note: This article is based on a paper delivered by the author at a meeting of the Ontario Rubber Section of the Canadian Chemical Association, held in Toronto, Canada, on February 20, 1941.

Author's Note: All rubber substitute currently used in Canada is produced either in England or the United States. Efforts are now being made to secure Canadian production from Canadian oils. If trouble is shortly experienced in securing adequate supplies of rubber substitute it is more likely to be because of transport facilities than because of any shortage of vegetable oil.

(1) Products of the Stamford Rubber Supply Co., Stamford, Conn.
(2) Products of the Anchor Chemical Co., Ltd., London, England.

brown, will lower tensile figures and also abrasion figures. The effect is that of a simple diluent or extender. Low tensile and low abrasion resistance are sometimes necessary. Two examples of this are erasers and printers' rollers. In the first a stock that will abrade easily is required, and in the second stocks sometimes as low as Shore 10 have to be ground with an absolutely smooth surface.

In routine handling in the factory it is usual to grind on a rubber mill any substitutes that are received in cake form. Many rubber compounds with a high substitute load also contain a large amount of oil. If the oil is poured on the ground substitute, it aids considerably in mixing this type of batch. The substitute carries the oil into the mix rapidly.

Hardness Controlled by Blending

Most compounders are familiar with only a few grades of brown and white substitutes, usually the harder or drier grades. It is possible to secure a wide range of softer substitutes and in compounds containing from fifty to three hundred per cent substitute on the rubber, hardness may be controlled by the selection of one or the blending of two substitutes. Some proofing grades are as low as 5 Shore hard, while the harder types run as high as 50.

Both white and brown substitutes are much used in proofing compounds which are applied to cloth in the form of heavy cements or doughs with a spreading machine. The substitute is said to improve the handling speed of compounds on the spreader and the evaporation of solvent from the spread films is said to be relatively more rapid and complete than from compounds containing no substitute. In some types of proofings the trade demand is for a very "dead" feel. This is easily produced with a proper selection and proportion of substitute without raising specific gravity to dangerous limits.

Brown substitutes are now widely used with the various synthetic rubbers. They are a definitely recommended ingredient in the technical literature of the synthetic manufacturers in quantities from 20 to 50% on the synthetic. In working with a synthetic rubber of high pound cost and which is not easy to break down, plasticize or soften on the mill in the ordinary sense of the word, a material which is a non-thermoplastic softener and extender is sure to be of value.

One approach to the use of either white or brown substitute in any calendered or extruded compound is to adjust the formula first for satisfactory processing and then adjust curing ingredients to the type, time and temperature of cure required.

White substitute retards the rate of cure of many compounds, particularly those using organic accelerators, but retardation can also take place where only inorganic acceleration such as litharge, lime or magnesia oxide is used. The old fashioned remedy for this was generally more lime or magnesia oxide. The more modern practice is 3 to 5% of triethanolamine calculated on the white substitute content of the compound. The usual explanation of retarding action in the type of compound is that loosely bound chlorine from the white substitute breaks off and reacts with available hydrogen, forming hydrochloric acid, the effects of which are well known in rubber stocks. It is probable that the strongly basic triethanolamine scavenges the hydrochloric acid as formed, the resulting hydrochloride having little effect on rate of cure.

About 30 years ago a standard rubber test formula in factory use was: Rubber, 100; Zinc Oxide, 100; Litharge, 20; Sulfur, 8. Twenty, 30 and 40 minute cures at 290° F. were made and tested. Occasionally another 100 parts of a new offering of pigment or other ingredients were added to this formula and comparison made with the then standard material.

In examining four new offerings of white substitute under the stated conditions, several test sheets in the series came from the mold in low to fair condition of cure but substantially white instead of the usual dark grey. The explanation made was that a chlorine reaction had been faster than a sulfur reaction with the litharge.

A small but interesting and very practical use of white substitute is to add about five per cent to ultra accelerated laboratory or experimental factory batches which would otherwise scorch up before they could be put in the mixture of sub-standard, off color and discontinued stocks that accumulate in most busy plants about twice a year. Such mixtures are usually worked away in definitely alkaline type compounds where the small amount of white substitute in the whole would cause no trouble.

Brown substitute does not retard cure unless used in exceedingly large percentages on rubber, in which case the retardation can be usually explained as mass action. There is some evidence that brown substitute in high gum and ultra accelerated stocks may cause bin curing trouble. If this trouble is found and the formula in question needs the brown substitute for processing qualities, the attack can easily be directed to the accelerator or acceleration scheme.

The Amberex type of rubber substitutes are interesting. It is possible to produce transparent stocks with as high as 50% Amberex on the rubber content in a simple formula and with cures around 15 to 20 minutes at 260° F. White and light colored calendered and extruded heater cured stocks are suggested as best value spots.

Substitutes for Special Purposes

On page 17 of the November-December, 1940, issue of *Vanderbilt News* is a series of compounds suitable for ozone resistant wire insulation. These are good examples of the use of high volume loadings of brown substitute for a special purpose, Tysonite *(3)* being understood as a special grade of brown substitute suitable for wire insulation compounding. The recommended quantity here is 200% on the rubber content.

Where substitute is used in volume in insulation formulae it is usually necessary to strain the stock or masterbatches used in the stock. The same practice is indicated for roll covering stocks which must be ground with smooth, non-pitted surfaces.

Substitute-containing stocks subject to abrasive wear usually abrade or wear smoothly. In times past the unwary consumer has often confused smooth wear with good resistance to wear. There are indications that high loadings of substitute produce stocks that do not hold inflation well, *i.e.*, are by no means impermeable. Fair loadings of both brown and white substitutes in molded goods compounds that are finally finished by tumbling are usual, and the surface is much improved thereby.

(3) Sold by the R. T. Vanderbilt Co., New York City.

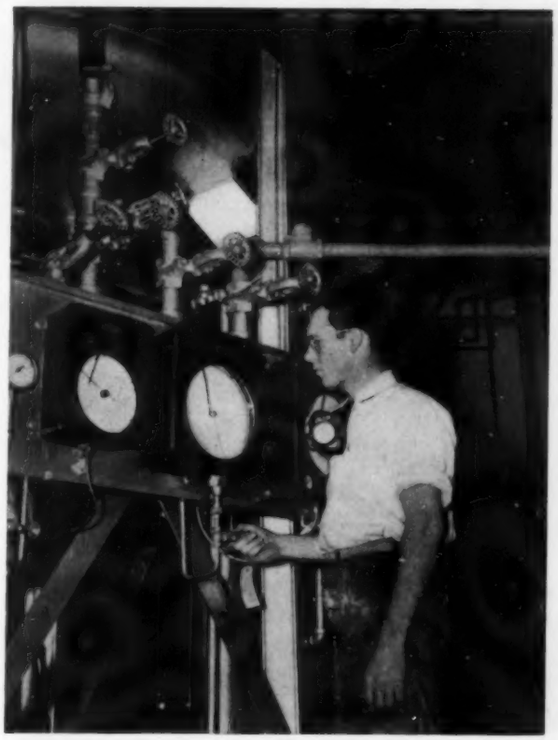
Goodyear's Chemigum

A Brief Description of the Manufacture and Properties of the Newest Synthetic Rubber

CHEMIGUM, the synthetic rubber developed by Goodyear which is said to be different from any of the synthetics now being produced in this country and superior in most respects to them, is derived from petroleum. In physical appearance Chemigum resembles brown crepe. It is quite tough and has a rather distinctive odor. Important advantages of the new synthetic, according to Goodyear, include increased tensile strength, resistance to aging, abrasion and oils, and the fact that it processes more easily than other synthetic rubbers, using the same general production methods and equipment currently used with natural rubber. It is also much more resistant to oxidation than natural rubber and has the possibilities for blending with natural rubber.

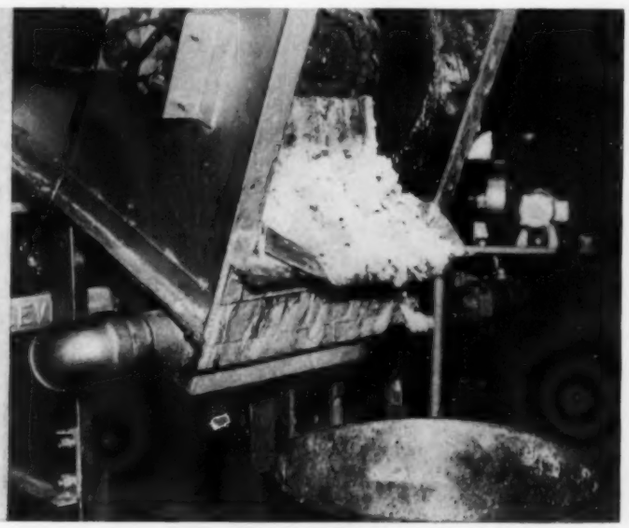
Chemigum differs from the natural product in that it is much less soluble in conventional rubber solvents, such as gasoline. In fact, Goodyear technologists claim, its resistance to these solvents is so good that some of the first commercial uses of Chemigum were in such articles as gasoline hose, hydraulic brake sealing rings and similar items where it came in contact with gasoline and oil. As to the physical characteristics, such as tensile strength, aging resistance, and resistance to abrasion, data available is said to give assurance that Chemigum is equal to, or perhaps superior to, natural rubber.

According to an announcement recently issued by Goodyear, Chemigum at present costs more than natural rubber. However, says the announcement, it gives promise of approaching the cost of the natural product if produced on a large scale. Its use in general commercial manufacture, therefore, will be limited.



The reaction process is carefully controlled by latest types of recording instruments.

First step in the manufacture of Chemigum is the mixing of the basic ingredients.



After the artificial latex is formed, it is coagulated and passed through a washer.

United States Rubber Declares Dividend on Its Common Stock

Representing the First Dividend on the Common in Twenty Years, It Reveals Remarkable Comeback of Company Under F. B. Davis, Jr.

As reported elsewhere in this issue, the United States Rubber Company has declared the first dividend on its common stock in twenty years. The intervening years had witnessed the collapse, convalescence and finally recovery of one of the country's largest industrial organizations. The struggle to reach this position is an industrial saga in itself and accordingly we are publishing herewith some data on it furnished by the United States Rubber Company, together with a summary of the company's history since its inception in 1892.—The Editor.

DECLARATION of a dividend on the common stock of the United States Rubber Company marks the end of twenty consecutive years to the day without dividends on this class of stock. But it more notably marks the reaching of the ultimate milestone in the company's rehabilitation by the management headed by F. B. Davis, Jr., an achievement considered particularly brilliant in the light of the business and industrial history of the past 12 years. For the management had steered the company back from a point of near-receivership to its present sound and preeminent position during that very period of American industrial history that had been the most difficult and complex industry ever faced.

In the depression that began in 1929, practically all American industrial companies staggered from one shock after another. Each company had its own problems in addition to the general shocks all business suffered in those years. But none had more severe problems than U. S. Rubber.

Decline in Price of Rubber

For U. S. Rubber had no means nor method for escaping the cataclysmic collapse of the crude rubber market that began in the middle of July, 1925, and lasted until the middle of 1932. In that period the price of rubber declined from $1.25 a pound to a low point of two and nine-sixteenths cents a pound. Each time the seemingly endless declines touched a new low, all rubber companies suffered new and severe inventory losses, with a consequent draining effect on each company's financial position.

Any industrial ship would have been rocked by a storm as severe as the crude rubber price decline. But when, to confound the situation further, the general depression came along, beginning in October, 1929, the picture for U. S. Rubber was desperate. Its funded debt and bank loans were $130,000,000 at a time when incessant inventory losses, plus the almost complete stoppage of business in the United States, left the company at the beginning of one bad year in the 1929-1932 period with practically no cash resources.

Further, to complete a bad picture, U. S. Rubber, since its formation by the consolidation of a number of companies in 1892, had accumulated a multitude of factories which were, in many instances, aging and inefficient by the 1920's, and were scattered all over the map.

Davis Takes Charge in 1929

It was not a heartening picture that faced F. B. Davis, Jr. when he stepped into the presidency of U. S. Rubber in the shadow of the worst of depressions. Davis was made chairman and president of the company on January 15, 1929. The spirals of business were still apparently going upward, to judge by the skyrocketing stockmarket, but, as is known now, the handwriting was on the wall. So far as U. S. Rubber was concerned the worst was yet to come.

But, in some respects—in ways that would not show up until later—the picture began to improve from that time. In certain fundamental ways the march toward full recovery, attested today by the common dividend declaration twelve years later, was begun. Davis elected as his first job to get his house in order. He eliminated antiquated factories and equipment. Selling and distribution methods were brought up to date. The complex corporate structure was simplified. He found himself with 123 separate subsidiary corporations, and beginning then and until now these were reduced to 29 companies.

Then the president set the company about its second job, to modernize its methods and equipment. Even then, the company had one particularly bright spot—its research laboratories were agreed to be the finest in the tire and rubber industry. Today these facilities are still accounted among the finest in the world. But much of what its laboratories had then worked for—improved equipment and methods—had not yet been applied to production. Today, the company builds its tires and other products on the most scientific of equipment—many of its extraordinary machines and principles having been devised from scratch in its own laboratories to fill demonstrated needs. The company has also developed in these research departments literally scores of new and important rubber products.

The recovery efforts of the management were aided by the healing process of time itself. The effects of the crude rubber collapse had worn itself out. Today

crude rubber production is on a sound economic basis, and for many years U. S. Rubber has profited in dividends from its rubber growing plantations. Little by little at first, and then here and there by courageous belt-tightening, the management reduced the company's back-breaking funded debt and bank loan total from the colossal sum of $130,000,000 to the present figure in 1941 of $41,000,000 of first mortgage bonds—a reduction of $89,000,000.

Position of the Plantations

The company is the largest owner of rubber growing plantations in the world. By 1941 it had recovered through profits more than the plantations had cost—this through the dividends it had earned from the plantations and through the annual reserves for depreciation. In the annual report for 1940, issued a month ago, the plantations were carried by the company at a gross value of $37,160,000 with an accumulated reserve for depreciation and amortization of $17,177,000, making the net book value $19,983,000.

"Lastex" yarn—the most remarkable textile development of the past decade—is a product of the company, and one of its important items of production. The company is foremost, or among the leaders in the world, in the production of automobile tires and tubes of all kinds, golf balls, mechanical rubber goods, hose, belting, packing, and molded goods, insulated wire and cable, chemicals for the rubber industry, rubber and canvas shoes of a hundred kinds, rain-coats and, varying from year to year, of more than 50,000 different rubber products.

Most interesting of all in the company's current products, perhaps, is the new latex foam. Some observers of the industrial scene believe that this foam rubber may in a very short period, become in itself an industrial giant of the stature of a new industry. Making already amazing progress as a material for all forms of seat cushioning, and for mattresses, some observers have predicted that it will eventually displace all other forms of cushioning because of its all-round advantages.

Saga of the U. S. Rubber Co.

The United States Rubber Company was organized March 29, 1892. Among the fifteen plants then extant, only two are now in operation: Goodyear's Metallic Rubber Shoe Company, Naugatuck, Connecticut—established 1843 and the oldest surviving plant operating under a license from Charles Goodyear, inventor of vulcanization; and Goodyear's India Rubber Glove Mfg. Co., Naugatuck, Connecticut—established 1844 and an original Goodyear licensee. The two together now constitute the company's Naugatuck Footwear Plant.

In 1907, United States Rubber Company acquired a majority interest in the Canadian Consolidated Rubber Company, Ltd., which was then manufacturing rubber footwear to a large extent, mechanical goods and clothing to a small extent, and was beginning to experiment in the automobile tire field. Gradually the facilities of the company in the United States were extended to the Canadian organization with the result that the Canadian subsidiary, which now operates as the Dominion Rubber Company, Ltd., occupies the leading position in the rubber industry in Canada, manufacturing all lines of rubber goods.

F. B. DAVIS, Jr.

who steered U. S. Rubber from near-bankruptcy to a top position in 1941.

The company early recognized the importance of producing a substantial part of its crude rubber requirements. As early as 1903 concessions of wild rubber lands exceeding 30,000,000 acres were acquired in Brazil, but the development was not consummated. After investigation of the rubber plantation industry in the Orient, United States Rubber Company in 1910 obtained territory in Sumatra, one of the islands of the Netherlands East Indies, and immediately began to plant. Subsequently, a large acreage was also secured in British Malaya.

Today the company has 132,000 acres of plantation lands, of which 102,236 acres have been planted, constituting the largest plantation holdings in the world under a single ownership. Production for the year 1940 was 65,157,000 pounds. There are 89,380 acres of mature trees and an average annual yield of 741 pounds per acre—a new high yield record achieved in 1940.

Ownership of these plantations has made it possible for the company to control the quality of its products by producing rubber precisely suited to the type of product into which it is to be manufactured. It has also made possible an enormous amount of research work, both in the domestic laboratories and on the plantations.

Location of the Plantations

The plantations in Sumatra are located in the residences of Sumatra East Coast and Langkat, and in British Malaya in the native states of Kedah, Selanger and Johore. The area in Sumatra is 104,232 acres and in Malaya 30,821 acres.

In 1911 the company purchased the Naugatuck Chemical Company, which had been established in

1904 to manufacture sulphuric acid for sale to the reclaiming plant operated in the same town, Naugatuck, Conn., now owned by the United States Rubber Company. The chemical plant has steadily expanded, and today manufactures not only a full line of chemicals of the types used in the rubber industry, such as accelerators, anti-oxidants, etc., but also many other heavy and intermediate chemicals, including aromatics, for other industries. In addition, it manufactures a variety of latex compounds and dispersions, and numerous chemical products resulting from rubber research. A rubber reclaiming plant, at Naugatuck, Conn., operates as part of the Naugatuck Chemical Division.

In 1912 the company's research and development activities were centralized and a Development Department organized to aid in the development of new products and processes and to provide technical research facilities. The General Laboratories of this department are located at Passaic, N. J.

United States Rubber Export Company, Ltd., was organized November 23, 1914, to handle all of the export business theretofore handled separately by each of the subsidiaries making up the United States Rubber Company. Foreign branches or offices are located in Argentina, Brazil, Chile, Colombia, Cuba, Puerto Rico, Peru, Venezuela, Mexico, Philippines, South Africa, New Zealand, England, Sweden, and Hong Kong.

The company also produces in its own plants cotton cord for the company's tire factories, some types of mechanical fabrics, rayon cord for tires, and light weight asbestos fabric. These plants are at Winnsboro, S. C., Hogansville, Ga., Shelbyville, Tenn. and New Bedford, Mass. Principal tire factories of the company are at Detroit, Mich., Chicopee Falls, Mass., and Indianapolis, Ind. A mechanical rubber goods plant is operated at Passaic, N. J., and a large rubber sundries plant at Providence, R. I.

In March, 1940 the company moved its general offices to the new twenty story United States Rubber Company Building which had been completed as the last unit of the great Rockefeller Center development in mid-town New York. Being the final unit in the "city within a city", the office building is perhaps the most modern such building in the world. All the latest improvements of such construction were incorporated in the building, including air-conditioning for all the offices.

Report on Shipment of Rubber in Rubber Wrapping

FOR some time shipments of crude rubber have been made on a small scale from the Far East with rubber itself as the wrapping material on bales. The U. S. Rubber Company is credited with having initiated shipments of such kind. In this connection, the Netherlands Indian Rubber Trade Association recently sent five bales of rubber packed in rubber wrapping to the Rubber Trade Association of New York to demonstrate the advantages of the new method of packing. The R. T. A. has reported its findings, as follows:

"The five bales which you forwarded to demonstrate the new method of packing without using straps and without any cover other than wrappers of the same quality rubber, were carefully inspected by the committees. The bales arrived in excellent shape, and under certain conditions this method of packing would appear to be quite satisfactory. Here again the committees feel that no change should be made in the R.M.A. packing specifications and that sellers wishing to ship rubber packed by this method should so agree with their buyers.

"Some apparent objections to this packing are that it would have to be confined to producers having proper facilities, that special care must be taken in stowing, that marks are apt to be obliterated, and that, because of its pressed condition, even under the most favorable circumstances it would be almost impossible to examine properly for quality before shipping it to consumers. We are placing the bales on exhibition for the benefit of our members and others who may be interested. Copy of a surveyor's report on their condition upon arrival is enclosed for your information."

The surveyor's report reads in part as follows:

"The 5 bareback bales of Ribbed Smoked Sheet were noted in stow on the starboard wing, center 1 lower, 'tween decks, immediately the hatches were opened. The 5 bales formed part of the lower tier of bale rubber which was seven-tier high with sassaks as dunnage and sassaks between the tiers. The bales were indented on both flats by sassaks to a depth of three-eighths of 1 inch.

"The bareback bales were each marked 101.6 kilos, with 'Peweja-New York' on one flat and 'Peweja' or 'Pewja' on one side. The rubber sheets were fully rubber wrapped and the outside of the rubber wrappers was coated with talc powder, and it would appear that there was a slight dampness to the exterior of the wrappers when the talc was applied to make it adhere.

"Two bales (Nos. 2-5) bore slight brownish spots from one-half inch to 2 inches in diameter, having the appearance of an oil or bitumastic, as though they had been in contact with a slightly dirty surface sometime before shipment. At the spots only, the wrapper sheets were somewhat weakened, but there had been no penetration and the contents were in no way affected.

"In 1 lower, 'tween deck, the adjacent cargo to rubber consisted of cases and bales of Pandan hats and bags of palm kernels; also in the same compartment were bags of graphite, which were enveloped in tarpaulins. The bales of rubber were in no way affected by adjacent cargo or cargo in proximity.

"Bales of rubber of similar pack and size are arriving in New York on nearly every vessel and, in our opinion, this method of packing is practical and superior to bales with burlap, matting or cardboard covers."

The only objection to the method of packing described above, which has been expressed already in the Netherlands Indies and which is now being mentioned by the New York Rubber Trade Association, concerns the taking of samples. However, it is the opinion of rubber men that practical experience will show whether this objection is indeed a deterrment to general application of the method. The primary problem now is to popularize this packing.

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Only moderate temperatures are employed in converting Micronex to the beaded form. This delicate treatment in no way effects the rate of cure or any other fundamental property.

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MICRONEX MEANS MORE MILEAGE

Editorials . . . . . .

Priorities on Rubber

EVER since the creation of the Division of Priorities, under Edward R. Stettenius, Jr., in the Office of Production Management, the rubber industry has been expecting some announcement concerning its basic raw material—both the natural and the synthetic. This was a natural expectation in view of the fact that rubber is so essentially a strategic material, one on which the country is dependent on foreign sources for supply, and more particularly in view of the concern expressed in Administration circles with regard to continued supply. The past month saw action taken on both crude and synthetic rubber.

As far as the crude is concerned, however, the action consisted solely of the creation of a special priority committee for rubber. This committee, which acts in an advisory capacity only, is composed of five members, representing the Army, Navy, producers, manufacturers and consumers. The interests of the producers are in the hands of A. L. Viles, president of the Rubber Manufacturers Association, who has attended many meetings of the International Rubber Regulation Committee as the American delegate and who therefore is well versed as to current problems of cultivation and delivery, while those of the manufacturers have been entrusted to W. L. Finger, assistant secretary of the Association, who is now out on "loan" to the Government. Little action may be expected from this committee unless this country is faced with a real emergency on crude rubber supplies.

The synthetic, however, is in a different position. A mandatory priority on neoprene has been ordered by the Office of Production Management. This means that any rubber manufacturer holding an order from the Government under the defense program, which calls for the specific use of neoprene in the finished product, must be given preference by DuPont, the manufacturers of neoprene, as regards delivery. It does not mean, however, that only manufacturers working on defense orders can use neoprene, but simply that such manufacturers must be given preference. If there is sufficient neoprene available then regular commercial products, such as gasoline hose, gloves, packings, etc., may continue to be made. DuPont is rushing increased production facilities at the neoprene plant in Deepwater, N. J.

There are, of course, other synthetics on the market. Thiokol has been available in commercial quantities for many years, and is currently doubling production. Hydrocarbon Chemical & Rubber Co. expects to put Hycar on a commercial basis within a month or two. Standard Oil is believed rushing a Buna plant to completion. Goodyear's commercial Chemigum plant is almost ready. Firestone has finished its first Buna plant. With one or two exceptions, however, it is not definitely understood which of these manufacturers will offer their limited production to the rubber industry at large.

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Minimum Wages

AS expected, Philip B. Fleming, Administrator of the Wage and Hour Division of the Department of Labor has named a special committee to investigate conditions in the rubber industry and to make recommendations as to minimum wage scales. Committees investigating other industries have previously been appointed and it was definitely known that the rubber industry was on the agenda.

These committees are usually appointed to cover industries where it is felt that minimum wages should be higher than those specified in the Wage and Hour Law. The committee investigating the rubber industry is empowered to recommend minimum wages up to 40 cents an hour. It is estimated that approximately 10,000 out of 130,000 workers in the rubber industry are now earning less than this amount. Because the recommendations of committees are usually accepted by the Administrator, it will be interesting to learn the outcome of the committee's investigation.

CURRENT NEWS OF THE MONTH

FLEMING, WAGE AND HOUR ADMINISTRATOR, APPOINTS SPECIAL COMMITTEE TO RECOMMEND MINIMUM RATES FOR EMPLOYEES OF RUBBER INDUSTRY

Graham, Larkin, Henkel, Lane and Woythaler Represent Rubber Manufacturers on Committee of Fifteen Which Will Investigate Current Conditions and Make Recommendations to Administrator

IN accordance with the terms of the Fair Labor Standards Act of 1938, Philip B. Fleming, Administrator of the Wage and Hour Division of the U. S. Department of Labor, on February 25 appointed a committee of 15, composed of five members each representing the public, the employees and the employers, to investigate conditions in the rubber industry and recommend minimum wage rates for that industry. Members of the committee follow:

For the Public: Arthur T. Martin (Chairman), Dean, Law School, Ohio State University, Columbus, Ohio; William Haber, Professor, University of Michigan, Ann Arbor, Michigan; Edmund D. McGarry, Professor, School of Business Administration, University of Buffalo, Buffalo, New York; Alexander Hamilton Frey, Law School, University of Pennsylvania, Philadelphia, Penna.; and Frank Lewand, Catholic University, Washington, D. C.

For the Employees: Frank P. Fenton, director of organization, American Federation of Labor, Washington, D. C.; Sherman H. Dalrymple, president, United Rubber Workers of America, Akron, Ohio; George Cummins, president, United Rubber Workers Local, Mishawaka, Ind.; Margaret C. Hemrick, United Rubber Workers Local, Ravenna, Ohio; and George R. Bass, president, United Rubber Workers Local, Akron, Ohio.

For the Employers: Thomas G. Graham, vice-president, B. F. Goodrich Co., Akron, Ohio; Leo Larkin, general manager, La Crosse Rubber Mills Co., La Crosse, Wisconsin; Paul H. Henkel, secretary and general manager, Continental Rubber Works, Erie, Penna.; F. Thatcher Lane, president, Seamless Rubber Co., New Haven, Conn.; and M. I. Woythaler, treasurer, Hodgman Rubber Co., Framingham, Mass.

Definition of the Industry

The rubber products manufacturing industry, for the purpose of the investigations of the committee, the members of which were chosen with regard to geographical concentrations of the industry, includes "the manufacture of all products which have as an ingredient any form of natural rubber (including latex), reclaimed rubber, scrap rubber, compounded rubber, rubber derivatives, balata, gutta-percha, or synthetic rubber, including parts for use in other products, and including footwear made by the vulcanizing of the entire article or the vulcanizing (as distinct from cementing) of the sole to the upper; the manufacture of reclaimed rubber; and the preparation of scrap rubber for use in manufacture of reclaimed rubber or rubber products."

Two exceptions, however, were made in the above definition, as follows: (a) Any product the manufacture of which is covered by an order of the Administrator defining an industry, and approving the recommendation of an industry committee or appointing an industry committee for such industry, issued prior to the signing of this order; (b) Abrasive wheels, brake linings, and insulated wire and cable. The latter products are covered or will be covered by other industry committees.

Definition of "Synthetic Rubber"

The term "synthetic rubber" as used in the Administrative order (No. 85) means "a synthetic substance which has physical properties resembling those of natural rubber." The term "preparation" means all operations involved in making scrap rubber suitable for use in the manufacture of reclaimed rubber or rubber products, and includes, but not by way of limitation, the separating, sorting and assembling of scrap rubber. It does not include, however, the mere collection and handling of scrap rubber by waste material dealers who perform no operations changing the shape or form of such scrap rubber.

A further definition of the rubber products manufacturing industry covers all occupations in the industry which are necessary to the production of products covered by the first definition, including clerical, maintenance, shipping and selling occupations, provided, however, that this definition does not cover clerical maintenance, shipping, and selling occupations when carried on in a wholesaling or selling department physically segregated from other departments of a manufacturing establishment, or when carried on in an establishment the greater part of whose sales are of products not covered in the definition; and provided, further, that where an employee covered by this definition is employed during the same workweek at two or more different minimum rates of pay he shall be paid the highest of such rates for such workweek, unless records concerning his employment are kept by his employer in accordance with applicable regulations of the Wage and Hour Division.

According to a statement issued by the Wage and Hour Division in conjunction with announcement of the Administrative order establishing the committee, the rubber products manufacturing industry employs approximately 130,000 workers, about 10,000 of whom receive less than 40 cents an hour. The committee is empowered to recommend minimum wages up to 40 cents an hour.

Location of Rubber Factories

While the manufacture of rubber products is carried on in almost all sections of the country, the major number of establishments are in the New England, Middle Atlantic and East and West North Central States. According to the 1937 census of manufactures, there were a total of 478 establishments, 406 of which were located in these geographic areas.

The first meeting of the newly-organized committee is scheduled to be held at the Washington Hotel, Washington, D. C., at 10:00 A.M. on March 25, when it will begin its investigations toward recommending minimum wage rates for all employees who within meaning of the Fair Labor Standards Act are "engaged in commerce or in the production of goods for commerce," excepting those employees exempted by virtue of the provisions of Section 13(a) and Section 14 of the Act.

Have You Ordered Your Space in the RUBBER RED BOOK—

There's not much time left to get in your order for space in the new and enlarged 1941 edition. May we urge that you send your order in *today* before you forget it.

RUBBER PACT IS REACHED BETWEEN U. S. AND MEXICO

An agreement has been concluded between the Departments of Agriculture of the United States and Mexico for intensive scientific experiments in rubber production, with a view to developing Mexico into one of the largest rubber-producing areas in the world, according to an announcement made in Mexico City on February 21.

Agricultural experts of both countries were confident that, perhaps within a single generation, the two Americas—North and South—would become independent of Asiatic markets through the development of scientific rubber cultivation in Mexico and other Latin American countries, including Brazil, Colombia, Costa Rica, Ecuador, Guatemala, Haiti, Nicaragua, Panama, Peru and Venezuela.

According to one official of the Department of Agriculture at Washington, D. C., agreements have already been concluded with all of these countries, and land has already been acquired and at least one experimental station established in each of them. Under these agreements, this official continued, the Department of Agriculture furnishes materials for the experiments, including rubber plant material developed to resist disease and grant high yields. Nurseries for seedling trees will be set up and trees distributed to prospective native commercial producers as quickly as possible.

Under the agreement with Mexico, the latter was said to have agreed to refuse the benefits of the experiments to "non-cooperating countries." This stipulation, it was said, means that only countries willing to share experimental data might have access to plants developed in Mexico, but it was thought that such countries as Japan would have a difficult time in sharing any benefits.

Some Other Developments

Several other developments in the crude rubber situation occurred during the past few weeks. It was learned on February 22 that the Government is surveying shipping facilities between the Dutch East Indies and the United States to assure adequate transport for crude rubber, vital to the national defense program. The survey was disclosed by Albert Sanderson, shipping specialist of the Department of Commerce, who said officials were prepared to act if necessary to overcome any serious shipping delays.

In a press conference on February 25, President Roosevelt, in answer to a direct question, said that the Administration is not concerned about any threatened shortage of crude rubber. He believes that the nation's supply of rubber is adequate and that there is no immediate danger of curtailment, and was emphatic in stating that there is no immediate necessity for increasing imports from the Indies.

Also of interest was the report that the Navy Department has authorized a comprehensive investigation in the rubber laboratory at Mare Island, the navy yard maintained in California, to determine the extent to which synthetic rubbers and guayule may be substituted for imported natural rubber. How far this investigation has gone to date was not revealed.

Coming Events

Mar. 17-19. Annual Meeting, N.A.W. M.D., Hotel Sherman, Chicago, Ill.

Mar. 21. New York Rubber Group, Building Trades Club, New York City.

Mar. 21. Akron Rubber Group, City Club, Akron, Ohio.

Mar. 27. Canadian Rubber Group, McMaster University, Hamilton, Ontario, Canada.

Mar. 28. Boston Rubber Group, University Club, Boston, Mass.

Mar. 31-Apr. 3. Spring Meeting, A.S.M.E., Atlanta, Ga.

Apr. 1. Los Angeles Rubber Group, Hotel Mayfair, Los Angeles, Cal.

Apr. 10-11. Rubber Division, A.C.S., St. Louis, Mo. Headquarters, Mayfair Hotel; Meetings, Hotel Statler.

May 1. Joint Meeting, Buffalo and Canadian Rubber Groups, General Brock Hotel, Niagara Falls, Ontario, Canada.

June 16-20. Semi-annual Meeting, A.S.M.E., Kansas City, Mo.

June 23-27. A.S.T.M. Annual Meeting, Palmer House, Chicago, Ill.

Sept. 8-12. American Chemical Society, 102nd Meeting, Atlantic City, N. J.

Hall to Handle Rubber-Glo

The C. P. Hall Co., of Akron, Ohio, has been appointed exclusive selling agent for Rubber-Glo, the non-toxic, non-tacky, odorless mold and mandrel lubricant recently announced by the Norris Manufacturing Co., of Paterson, N. J. A complete description of this new lubricant appeared in the February, 1941, issue of RUBBER AGE.

Two new additions to the present molded rubber goods plant of the St. Mary's Manufacturing Co., subsidiary of the Goodyear Tire & Rubber Co., at St. Mary's, Ohio, designed to increase production capacity by 50%, will be started shortly. The cost of the new additions will come to $300,000.

PRIORITY ON NEOPRENE DECREED AS DEFENSE AID

A mandatory priority on all supplies of neoprene in the United States was ordered by the Priorities Division of the Office of Production Management on March 7. The action was made necessary, according to E. R. Stettinius, Jr., director of priorities, in the interests of the national defense program and its needs. Priority on nickel was ordered at the same time. Previous priorities have applied to aluminum, magnesium and machine tools.

Establishing a priority on neoprene, product of the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., means that contracts or orders for the material placed with DuPont which enter directly or indirectly into the manufacture of any material for the Army or the Navy will have a preference rating, the purpose of which is to ensure delivery on the required date so that the concern can in turn meet the date specified on defense orders.

Companies now using neoprene, which feel that cutting off their source of supply of this synthetic, if it should become necessary to cut off or curtail such supply, will result in "grave hardship" have the privilege of presenting their case to the Division of Priorities. Where there is doubt as to whether any particular order constitutes a defense order, such matters will also be referred to the division.

DuPont recently made known the fact that almost its entire production of neoprene was being earmarked for defense, so that the rubber manufacturing industry has already received due warning. New production facilities now under construction at the neoprene plant in Deepwater, N. J., will bring annual production up to about 9,000 tons annually.

New Goodrich Tire Line

A new automobile tire, called the DeLuxe Silvertown, which is strengthened with Duramin, and features a new construction principle which provides added protection against heat and the hazard of blowouts, has been announced as a leader in the new Goodrich 1941 tire line. The construction principle is called "Safety-Weld." It is a process that bonds Hi-Flex cords and heat-resisting rubber compounds as one integral unit. The tread is of "variable pitch" design, the basic bar design of the tread being broken up by narrow indentations, called kerfs, that are scientifically placed for noise elimination and maximum skid resistance. The most popular size, the 6.00 x 16 tire, has 276 kerfs. Other tires in the new line are the Patrician Silvertown, Ameripol Silvertown, Safety Silvertown, Life-Saver Tread Silvertown, and the Standard.

CURTISS-WRIGHT ENGINEER ADDRESSES BUFFALO MEETING

Approximately fifty members and guests of the Buffalo Group, Rubber Division, A.C.S., attended a meeting of the group held on February 28 at the Hotel Lenox in Buffalo to hear Roy T. Clay, power-plant engineer of the Curtiss Airplane Division of the Curtiss-Wright Corporation deliver a paper on the use of rubber in the construction of modern airplanes.

According to Mr. Clay, the use of rubber in modern aircraft is more critically important than its use in automobiles because of the tremendous concentration of large h.p. engines and the requirements of construction niceties. He estimated the number of rubber parts used to be between 300 and 400, depending on the type of plane, and total weight of such parts to be approximately 60 pounds.

The speaker presented a detailed list of the rubber parts, describing each one and its function briefly, including tires and tubes, de-icers, engine mounts, instrument mountings, air and hydraulic seals, flexible ducting, pipe connections, tank supports, tanks, flotation bags, life rafts, propeller cuffs, and seat cushions. The use of thick beds of rubber in forming metal parts, he said, has been responsible for many improvements in design and manufacture.

During the meeting chairman John S. Plumb (U. S. Rubber Reclaiming) presented to the members an invitation received from the Ontario Rubber Section of the Canadian Chemical Association to hold a joint meeting. This suggestion met with approval.

Editor's Note: It has since been learned that the joint meeting will be held on Thursday, May 1, at the General Brock Hotel, in Niagara Falls, Ontario. Arthur N. Neal, head of DuPont's rubber laboratory, will speak on "The Plasticization of Rubber."

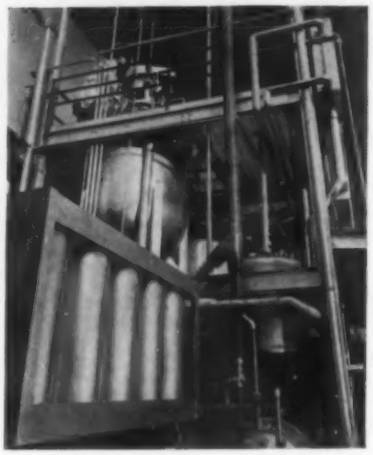
Chicago Group Holds Meeting

The Chicago Group, Rubber Division, A.C.S., was scheduled to hold a special meeting on March 14 at the Eitel Field Building Restaurant in Chicago. The program included the delivery of an address on "The Manufacture of Rubber Products in Europe Today," by Arnold Smith, of the Monsanto Chemical Co., and election of officers. A complete report on the meeting will appear in the next issue.

Rhode Island Club Meets

The Rhode Island Rubber Club was scheduled to hold a meeting on Friday, March 14, at the Narragansett Hotel in Providence, R. I. A sound picture on Africa was to have been shown. A complete report on the meeting will appear in the next issue.

Firestone's Synthetic Plant



First distillation unit completed

The accompanying illustration shows the first unit of the new synthetic rubber plant recently completed by the Firestone Tire & Rubber Co., presumably for the manufacture of Buna. The distillation unit shown, which has recently been put into operation, reaches to the roof of a three-story building. It will serve as a pattern for another unit which will be constructed sometime this year and which will double present production. The original pilot plant, it has been announced, will be used only for experimental batches which research chemists will use in their continued experiments.

Tuttle to Address Boston Group

Dr. John B. Tuttle of the Standard Oil Company of New Jersey will be the principal speaker at the mid-winter meeting of the Boston Group, Rubber Division, A.C.S., to be held on Friday, March 28, at the University Club in Boston. Dr. Tuttle will speak on "Petroleum Products in Rubber," and will discuss petroleum solvents, plasticizers and reclaiming oils. For divertissement, Bertram Adams, past president of the Society of American Magicians, will give his "Demonstration of Psychological Deceptions for Agile Minds."

Akron Group Meets March 21

The next meeting of the Akron Group, Rubber Division, A.C.S., will be held on Friday, March 21, at the Akron City Club. The oyster bar will open at 6:30 P.M. and dinner will be served at 7:00 P.M. A technicolor film, "The Power Behind the Nation," will be shown through the courtesy of the Norfolk & Western Railroad, while the Underwriters Barber Shop Quartet will perform. Election of officers will also be held. Tickets are $1.50 each.

THREE PAPERS PRESENTED AT MEETING OF CANADIAN GROUP

Three papers, two technical and one general, all prepared by members of the group, were featured at the meeting of the Ontario Rubber Section of the Canadian Chemical Association, held at the University of Toronto, in Toronto, Canada, on February 20. The papers, authors and brief abstracts follow:

Rubber Substitute as a Compounding Material, by O. B. Crowell, Viceroy Manufacturing Co.—Different types of substitutes available were discussed and the advantages of each type stressed, particularly from the angles of mixing, tubing and calendering. (Note: This paper is reproduced elsewhere in this issue).

Engineering and General Uses of a Pyrometer in a Rubber Factory, by C. L. Brittain, Gutta Percha & Rubber Co.—A brief description of thermocouples and potentiometers used in rubber factories was given. Their specific use in obtaining satisfactory cures in thick blocks of rubber, as in tires, belting, etc., was discussed, as was the use of thermocouples for checking temperatures in hot air vulcanizing.

Some Recent Experiences in Britain, by L. A. Winters, Dunlop Tire & Rubber Co.—An eye-witness account of the aerial warfare over England was given. Some of the preparations already made to repel possible invasion were also discussed.

During the meeting it was announced that Thomas Batty of the Firestone Tire & Rubber Co., Hamilton, Ontario, has been appointed to fill the office of secretary-treasurer of the group, replacing R. B. Symons, formerly of the Canada Wire & Cable Co., who recently joined Firestone Rubber & Latex Co. at Fall River, Mass.

The next meeting of the group will be held on Thursday, March 27, in Hamilton Hall, McMaster University, Hamilton, Ontario, at 6:30 P.M. M. J. C. Lazier, Assistant Professor of Applied Mechanics of the University of Toronto, will speak on "Why Aeroplanes Are Like That."

Set March 21 for N. Y. Meeting

The Spring Meeting of the New York Group, Rubber Division, A.C.S., will be held on Friday, March 21, at the Building Trades Club, 2 Park Avenue, New York City. As usual, the meeting will start at 4:00 P.M. and dinner will be served about 6:00 P.M. Talks on "What Is Being Done to Insure Adequate Crude Rubber Supplies for the U. S.," by A. L. Viles, president, Rubber Manufacturers Association, and "The Crude Rubber Situation," by E. G. Holt, Chief, Leather & Rubber Division, Bureau of Foreign and Domestic Commerce, will be given, in addition to a talk and moving picture on "Electrocoating" by J. O. Amstuz, chief engineer, Behr-Manning Corp.

UNITED RUBBER WORKERS UNION PLANS EARLY INTENSIVE DRIVE

The United Rubber Workers of America, which claims to be the collective bargaining agent for 100,000 employees, or more than 80% of the rubber industry, has picked the present as the brightest moment in years to consolidate gains and make an intensive drive in the industry for wage increases, according to an article in a recent issue of *Business Week*. Both immediate and long-range goals are sought in the drive.

Despite the present importance of negotiations now current with tire plants, the article continues, union officials realize that their brightest prospects are in the mechanical rubber goods plants, where such innovations as latex foam sponge are being expanded. The union is reconciled to the fact that jobs in the tire-building end of the industry are not likely to increase, due to the continuing improvement in tire performance. Today's cars run farther with greater safety on fewer tires, and the trend is expected to continue.

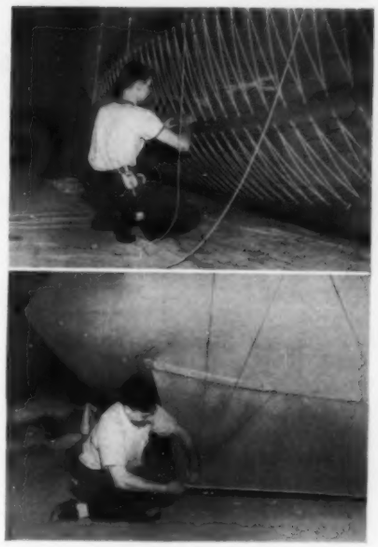
According to latest reports, the United Rubber Workers of America now has a total of 130 chartered locals. The union has added 10 organizers to its field personnel within the last year. It has also compiled statistics on wage rates, annual incomes, and company profits to furnish talking points. According to the union's data, compiled from government reports, 44% of all rubber workers earned less than $1,000 in 1938; those earning less than $2,000 accounted for nearly 90% of the total.

There is little doubt that one current objective of the union is the signing of contracts in the plants of the Goodyear Tire & Rubber Co., the industry's major holdout to unionism. In its drive for recognition at Goodyear, the union has announced a demand for a 10% wage increase.

United Carbon Wins Patent Suit

In an order entered last month in the Federal Court at Charleston, West Virginia, by District Judge A. D. Barksdale, of Roanoke, Virginia, who presided at the trial, the United Carbon Company was found not guilty of infringement of the Wiegand-Venuto patent for making free-flowing dustless black pellets. The suit was brought by the Binney & Smith Co., owners of the patent. Judge Barksdale dismissed the suit at the expense of the plaintiff on the ground that the latter had no cause for action, holding that there were recognizable differences in porosity, purity and uniformity between the pellet black sold by both plaintiff and defendant. According to the decision, the product described in the Wiegand-Venuto patent "does not require the exercise of the inventive faculty and is lacking in novelty."

Barrage Balloon Construction



One tested form of protection against aerial bombardment is the barrage balloon, and workmen in the above illustration are seen assembling balloons of this type in the Akron factory of the Goodyear Tire & Rubber Company for experimental use of the United States Army. The top photograph depicts the application of finishing touches to the balloon while the bottom one shows the assembling of the stabilizer on the tail.

Celebrates 25th Anniversary

The year of 1941 marks the twenty-fifth anniversary of the Wilson Rubber Co., of Canton, Ohio. Founded by Fred J. Wilson, John S. Willis and Wendell Herbruck, the company first leased the second floor of a small building in Canton and started the production of surgical gloves with a staff of 10 employees. In the spring of 1918 the company moved into its own building and doubled its production. Widening its production to include household and electricians' gloves, the company was soon forced to add a factory addition. Subsequent additions raised the company to the position of the world's largest manufacturer of rubber gloves, a position Wilson claims to maintain at present. The Wilson Rubber Company has pioneered several major developments in the glove field and faces the future with full confidence in its ability to foster further developments.

Expanding Wooster Rubber Plant

Construction of a $20,000 addition to the plant of the Wooster Rubber Co. at Wooster, Ohio, has been announced by J. R. Caldwell, president. The company, which started in 1934 with three men and a girl, now employs 120 with an annual payroll of more than $100,000. The new addition will be a two-story, 45 by 100-foot structure.

JONES MARKING TIME ON SYNTHETIC RUBBER PLANTS

Based on a statement made by Jesse Jones, Secretary of Commerce and head of the Reconstruction Finance Corporation, it is now apparent that the R.F.C. is marking time on its recently advanced plans to build synthetic rubber "stand-by" plants. On February 20 Mr. Jones said that present crude rubber stocks in the United States were sufficient to last two years and that R.F.C. consideration of a "stand-by" plant or of loans to commercial firms to build commercial plants was "general and to be used only in event of an emergency."

In view of the fact that all previous reports indicated that the chief of the Reconstruction Finance Corporation was greatly concerned over developments in the Far East and would move shortly to approve loans for domestic plants for the production of synthetic rubber, his latest statement came as a big surprise, particularly since it followed on the heels of a statement by P. W. Litchfield, chairman of the Goodyear Tire & Rubber Co., to the effect that the shipping situation on crude rubber is becoming acute and causing some alarm in the tire industry.

One reason advanced for Mr. Jones' present view of the problem as "general" and not particularly pressing is said to be the failure of members of the rubber industry to advance an acceptable plan involving R.F.C. loans for private construction of synthetic rubber plants. Several rubber manufacturers, of course, are going ahead with their own construction plans and have indicated that output could be stepped up considerably as soon as acute need is anticipated.

New Rubber Springs Developed

United States Rubber Company has announced the development of rubber springs for mine cars. Introduced on a new, streamlined all-steel car built by the Irwin Foundry & Mine Car Co., of Irwin, Penna., for the Kehoe-Berge Coal Co., of Pittston, Penna., the rubber springs are said to offer a number of advantages over conventional steel springs, including better spring action, quieter ride, increased economy, and greater dependability, and safety. Two types of rubber springs are used in the installation, one a shear and the other a compression type. The shear type spring carries the load while the car is empty. Each measures ¼x3-5/16x3⅜ inches. Four springs are used on each car and carry a load of 5,000 pounds. The compression type spring carries the total load of car and coal. There are also four of these springs on each car, carrying a total load of 19,000 pounds. These springs measure 4x13x1¼ inches.

NEWS IN BRIEF

Cleveland will be a storage center for part of the 400,000-odd tons of stockpile rubber being amassed by the Government for emergency purposes. A six-story warehouse at East 23rd Street and Lakeside Avenue has been rented by the Cleveland Storage Co., Inc., for that purpose. The warehouse has 125,000 square feet of floor space.

Shell Oil Co., Inc., has awarded a contract for the construction of a plant at its Houston, Texas, refinery for the manufacture of butadiene. The contract was awarded to the C. F. Braun Co., of Alhambra, Calif., and construction will start immediately. The plant is scheduled to be in operation by early summer.

The Titanium Division of the National Lead Co. is negotiating for the purchase of property held by the McIntyre Iron Co. in Essex County, New York, which contains extensive deposits of iron ore said to be rich in titanium.

The consulting research laboratories of the late Carleton Ellis are to be continued, according to Bertram Ellis, one of his sons, who has been actively associated with Ellis Laboratories, Inc., Montclair, N. J., and who is now president of the company.

Construction of a new 40 x 40 foot addition to the plant of the Standard Products Co. at Port Clinton, Ohio, was started recently. When completed, it will increase the company's rubber mixing department by approximately 1500 square feet and will enable the installation of two new 60-inch mills.

The question of whether synthetic rubber may be used in the manufacture of erasers has been answered by the Goodrich laboratories which states that "certain stocks of Ameripol in a crude state will do a fair job of rubbing out pencil marks and full compounding would probably enable the synthetic product to equal this function of natural rubber."

A change in corporate structure has been announced by the Virginia Rubatex Corporation. The concern is now known as the Virginia Rubatex Division of the Salta Corporation. No other changes occurred, the officers, policy, etc., all remain as heretofore.

Work on a factory in Norwalk, Ohio, to be occupied by the Durable Mat Co., of Seattle, Washington, has been started. The factory, which is expected to be ready for occupancy by next May, will employ 40 workers at the outset.

Shellmar Products Co., Mt. Vernon, Ohio, has been awarded a $76,050 Army contract for the manufacture of Pliofilm bags which will be used as moisture-proof containers to shield gas masks from becoming damp while in storage with resulting deterioration.

The Mitsui interests of Japan, in collaboration with I. G. Farbenindustrie of Germany, will soon begin extensive experimentation on synthetic oil and rubber, it has been announced. For this purpose the Japanese concern's chemical laboratory at Meguro will be expanded considerably in the near future.

Goodyear's plant for the increased production of Chemigum, now under construction, is expected to be ready for operation by April 1. Production is limited at present to a small pilot plant, and opening of the new unit will increase production by 300%.

The economic importance of crude rubber cultivation to Latin America, and to the United States itself as a result of such cultivation by its sister republics, is well told in an article entitled "The Return of Rubber," by Charles Morrow Wilson, in the March, 1941, issue ot *Coronet*.

Concrete-Grade Ampruf, a synthetic rubber coating for concrete floors subject to dampness, alkali and chemical attack, has been introduced by the American Waterproofing Co., 53 Rodney St., Brooklyn, N. Y. Gray, brown, red, green and mahogany colors are available.

Koroplate, a new grade of Koroseal paint, developed to protect metal surfaces against chemical reactions and recommended for service wherever extremely corrosive conditions disqualify other types of paint, has been announced by Goodrich.

Toledo Industrial Rubber Co., Toledo, Ohio, has signed an agreement with the Rubber Workers Federal Labor Union No. 22426, affiliated with the American Federation of Labor. The agreement embraces a closed shop and a check-off system. A pay increase was also provided.

Fifty thousand rubber trees have been planted and land is being prepared for 150,000 more in an experiment being directed in Honduras by United States and Honduran agricultural experts. The new plantings are located along the Atlantic coastline of Honduras.

Kleinert's High-Chair Pads

High chair pads for boys and girls, featuring colorful stencil figures which hold special appeal to infants, have been introduced by the I. B. Kleinert Rubber Co., New York City. Made of "climate-proof" rubber, which will not crack, stick or peel, the pads are said to be highly practical because they may be sponged off and kept clean easily. The pads retail at $1.79 each.

The Legislative Council of Singapore enacted a special war tax of 2½% ad valorem on exports of crude rubber last month, the proceeds of which will be contributed to the Imperial Exchequer for war purposes. A similar tax has been imposed in the Federated Malay States and an identical one is shortly expected in British Malaya.

Ground was recently broken for the $500,000 factory addition of the General Tire & Rubber Co., in Akron. The first four floors, which will be used for manufacturing purposes, are expected to be ready for occupancy by next May, with the remaining two floors, intended for use as general offices, scheduled for completion shortly thereafter.

To meet the demand for packing information on exported products and to provide a basic reference work covering this subject, the Transportation Division of the Department of Commerce has prepared a comprehensive manual entitled "Modern Export Packing." Copies of the manual may be obtained from the Superintendent of Documents, Washington, D. C., for $1.00 per copy.

The Convention of the National Association of Waste Material Dealers, Inc., to be held at the Hotel Sherman in Chicago on March 17-19, will feature an equipment and industry exhibit. Exhibitors interested in space should communicate with the Association at the Times Building, New York City.

RIGHT TO SUE AS "PERSON" IS SOUGHT BY GOVERNMENT

The Supreme Court was asked on March 6 to determine whether the Federal Government could sue as "a person" under the Sherman Anti-Trust Act to collect treble damages of $1,053,474 from 17 tire manufacturers accused of collusive bidding in connection with government bids on tires. The question is regarded as being especially important at this time when due to the billions being spent for defense the Government must be armed with every weapon to combat identical bids for war materials, according to a spokesman for the Department of Justice.

Hugh B. Cox, special assistant to the Attorney General, argued that the word "person" was sufficiently broad to cover the Government in a triple damage suit, but Luther Day, appearing for the tire manufacturers, asserted that such a construction was impossible. Mr. Day further pointed out that the Government had never attempted to sue for triple damages in the 50 years since the Sherman Act was passed. The Supreme Court took the matter under advisement.

According to the indictment, the 17 tire manufacturers were accused of a conspiracy to fix collusive prices in three separate periods in 1936, 1937 and 1938. The companies submitted sealed bids on 82 tire sizes which, in each case, were identical to the penny and at increasing prices Nevertheless, the Government bought at the tire makers' prices for the first two periods, but rejected the third bid. New bids were requested in the latter instance and again they were identical and rejected. As a result, the Treasury Department decided that a "public emergency" existed and negotiated and bought direct from Sears, Roebuck & Co.

Estimating its losses on the three identical bids to be $351,158, the Government filed suit under the civil terms of the Sherman Act alleging triple damages of $1,053,474. Original suit was filed on February 20, 1939, in the United States District Court in New York City, and on March 5, 1940, Judge Edward A. Conger dismissed the suit on the grounds that only a "person" was privileged to sue under the triple damage clause of the Sherman Act and that the definition of the term "person" in the Act did not include the Government. This decision was appealed, but on August 8, 1940, the Circuit Court of Appeals in the New York District, in a two-to-one decision, upheld the ruling of the lower court.

Ford tires, which have been standard equipment on all Ford cars since last year, have now been made available to the replacement market. All popular sizes are included in the replacement line.

Donald D. Wright

Donald D. Wright, the new vice-chairman of the Boston Group, Rubber Division, A.C.S., was born in Leslie, Michigan, on July 24, 1897. He attended Leslie High School, studied pharmacy at Ferris Institute, and then took up chemical engineering at the University of Michigan, securing his bachelor's degree in chemical engineering from the latter University in 1920. He joined the Hood Rubber Company shortly after being graduated and has remained with that company since, now occupying the position of chief chemist.

Mr. Wright's contributions to the rubber literature include investigations of hard rubber reactions, development of a shear test, and considerable work on lacquers and varnishes. In addition to the Boston Rubber Group, he is a member of the Boston Division of the American Chemical Society and Alpha Chi Sigma. His recreations and hobbies include reading, gardening, winter sports and swimming, with an occasional fling at golf, tennis and badminton. Mr. Wright is married and has one daughter.

New Agricultural Publication

The Office of Foreign Agricultural Relations, Department of Agriculture, Washington, D. C., has started publication of a new monthly journal called "Agriculture in the Americas." The new journal, which is available on a subscription basis of 75c per year in the United States and possessions and $1.20 in foreign countries, will report in particular on crops which Latin America can grow for use in this country. The first issue, dated February, 1941, includes an article on "Speaking of Rubber," by Edgar R. Burkland, a discussion of the economic importance of rubber and the necessity of a continuous supply.

REGULAR MEETING HELD BY LOS ANGELES RUBBER GROUP

Despite a driving rain, one of the hardest Los Angeles has had in many years, approximately 105 members and guests attended the regular monthly supper meeting of the Los Angeles Group, Rubber Division, A.C.S., held at the Hotel Mayfair on Tuesday evening, March 4.

Geoffrey F. Morgan, lecturer and humorist, through the courtesy of the Douglas Aircraft Company, gave his lecture on "The Story of The Douglas Company," a talk that included a few of the highlights in the life of Donald Douglas, head of the company.

Carl B. Squier, vice-president and sales manager of the Lockheed Aircraft Company, sent Robert M. Mallett to show the recently completed picture, "Look to Lockheed for Leadership." The production of this picture represented about two years work.

A number of members of the group indicated interest in a proposed golf tournament with the thought of deciding ownership of a golf trophy. If the tournament materializes it will be under the direction of E. G. Brooks, golf ball manufacturer.

The United Carbon Company offered a Philco radio as a special prize. The door prize, an electric clock, was given by the H. L. Butcher Company, which also gave mechanical lead pencils as table favors.

The next meeting will be held in the same hotel on Tuesday evening, April 1. Gaelen K. Norton is chairman of the program committee while L. L. Horchitz is president and presides at all meetings. The May meeting will be the last meeting of the season; then the boys will go fishing.

RUBBER PRIORITY COMMITTEE ESTABLISHED BY STETTINIUS

Creation of a priority committee for rubber was announced on February 20 by E. R. Stettinius, Jr., director of priorities for the Office of Production Management. Members appointed to the committee were A. L. Viles, president, Rubber Manufacturers Association, producers' representative; Major G. K. Heiss, Army representative; Commander H. M. Shaffer, Navy representative; W. L. Finger, consultant from the production division. A representative of the industrial consumers will be appointed shortly.

The new priority committee comes under the General Products Group, of which W. E. Wickenden is chief executive. He will serve as chairman of the committee, which functions in an advisory capacity only. At the time this new committee was appointed, Mr. Stettinius also announced the appointment of Philip D. Reed, chairman of the board of the General Electric Co., as a consultant.

NAMES IN THE NEWS

WALLACE W. DELANEY, vice-president of the Seamless Rubber Co., New Haven, Conn., becomes president of the Faultless Rubber Co., Ashland, Ohio, on April 1, succeeding C. D. HUBLER, who continues with the company as executive vice-president.

ARTHUR KELLY, until recently manager of the Clarksville, Tenn., plant of the B. F. Goodrich Co., has been named general superintendent of the Miller division of the company at Akron. He is succeeded at Clarksville by CLIFFORD R. SPENCER, formerly production manager of molded goods at Akron.

JOHN G. HARRISON, JR., associated with the laboratories of the Firestone Tire & Rubber Co., at Akron and Memphis, Tenn., for the past six years, has joined the Vulcan Proofing Co., Brooklyn, N. Y., as a research chemist.

HAYDEN W. SHIVELY, managing director of Goodyear Orient, Ltd., rubber buying company in Singapore, has been appointed assistant manager of government sales and aeronautics of the Goodyear Tire & Rubber Co. He has been with Goodyear since 1919.

JAMES W. YOUNG tendered his resignation as director of the Bureau of Foreign & Domestic Commerce of the Department of Commerce on February 14. He will become director of communications for Nelson A. Rockefeller, Coordinator of Commercial and Cultural Relations with the American Republics.

ERNEST C. LOW, associated with John A. Roebling's Sons Co., Trenton, N. J., for the past 32 years, has been named general manager of sales for that company. For the past year he served as president and general manager of the company's California subsidiary.

PHILLIP M. EARHEART, formerly associated with the Inland Manufacturing Division of General Motors and the B. F. Goodrich Co., has joined the Buffalo Weaving & Belting Co., Buffalo, N. Y., as a research chemist.

E. G. KIMMICH, manager, mechanical goods research, and N. E. KIMBALL, manager, tank lining sales, Goodyear Tire & Rubber Co., Akron, were each awarded diamond-studded pins last month upon completing 25 years of service with the company.

HOWARD WILEY, until recently associated with the Gates Rubber Co., Denver, Colorado, as a research chemist, has joined the U. S. Rubber Reclaiming Co., Buffalo, N. Y., in the same capacity.

JOHN L. COLLYER, president, B. F. Goodrich Co., Akron, was elected to the Board of Trustees of Cornell University last month. A member of the Class of 1916, MR. COLLYER was one of the greatest stroke oars in the University's crew annals.

CLAY HERRICK, formerly associated with the advertising and publicity firm of William Ganson Rose of Cleveland, has been named publicity director for the General Tire & Rubber Co., Akron.

CLINTON H. CRANE and ANDREW P. FLETCHER, president and vice-president, respectively, of the St. Joseph Lead Co., received critical injuries in an automobile-truck collision near St. Louis, Mo., on February 27. They were on their way to inspect a lead mine at Bonne Terre, Mo., when the accident occurred.

GEORGE SHERMAN, until recently with the mechanical goods division of the U. S. Rubber Co. at Detroit, Mich., has joined the Wolverine Fabricating & Manufacturing Co., Inc., also of Detroit, as a sales engineer.

COL. J. L. COCHRUN, vice-president in charge of sales of the Seiberling Rubber Co., Barberton, Ohio, was elected a director of the company last month to fill the vacancy caused by the retirement of ROBERT GUINTHER, Akron attorney, who continues as general counsel of the company.

HOWARD P. DEVILBISS and ROY A. GUYER were elected vice-presidents of the DeVilbiss Company at the annual meeting of the company held in Toledo, Ohio, on February 24. Both men have been associated with DeVilbiss for many years.

GEORGE E. PRICE, JR., purchasing agent of the Goodyear Tire & Rubber Co., and president of the National Association of Purchasing Agents, discussed "National Affairs" before a meeting of the Cincinnati (Ohio) Association of Purchasing Agents, held in Cincinnati on February 12.

JOHN W. CLARKE has been appointed representative of the Roller-Smith Co., manufacturers of electrical measuring and protective apparatus, for the Chicago territory, comprising the northern half of Illinois, northern Indiana, Wisconsin and eastern Iowa. He succeeds the late E. E. VAN CLEEF.

Dr. Boss Heads Pigment Sales

Dr. A. E. Boss, until recently manager of the technical service department of the Columbia Chemical Division of the Pittsburgh Plate Glass Co., has been named manager of pigment sales for that Division. He will establish headquarters in New York City and will devote his time to the further development of Calcene sales and the establishment of a new program in the interest of Silene. Dr. Boss, who was once associated with Goodrich as a research chemist on pigments, has been with Columbia Chemical since 1932, serving respectively as research chemist, technical sales representative, assistant manager of special products sales, and manager of the technical service department.

Elects Officers and Directors

Dispersions Process, Inc., of Naugatuck, Conn., manufacturer of aqueous dispersions of reclaimed, crude, and synthetic rubbers, announces the election of three new officers and one new director. The new officers are: John P. Coe, vice-president; Arthur Surkamp, treasurer; Oscar W. Greiner, assistant secretary. Mr Surkamp was also elected a director. Officers who were reelected are: F. B. Davis, Jr., chairman; Elmer Roberts, president; Arvid J. Anderson, assistant treasurer; and Eric Burkman, secretary. The new board of directors is comprised of Paul H. Arthur, Eric Burkman, John P. Coe, F. B. Davis, Jr., Morris E. Dry, Willis A. Gibbons, Harry E. Humphreys, Jr., Elmer Roberts, and Arthur Surkamp. John P. Coe and T. G. Richards continue as general manager and sales manager, respectively.

BUREAU OF THE CENSUS GIVES DATA ON COTTON TIRE FABRICS

Cotton tire fabrics produced in American cotton mills in the last 20 years have amounted, in terms of weight, to the equivalent of over six million 500-pound bales of cotton, according to records of the Bureau of the Census based on biennial reports since 1919 in the Census of Manufactures.

This total is based on the annual average calculated for those years in which the Census of Manufactures was held and applied to the intercensal years. The annual average production of tire fabrics for all census years in the two decades was 160 million pounds.

The average annual reported factory value of tire fabrics during the two decades covered by the Census statistics was approximately 80 million dollars, or over a billion and one-half dollars for the 20-year period.

Production of tire fabrics, as reported biennially, in the Census of Manufactures, during the two decades from 1919 to 1939, is given below:

Year	Pounds	Square Yards	Value
1939	163,389,300	208,890,000	$ 37,786,000
1937	167,688,400	203,020,200	46,929,700
1935	118,303,700	146,968,500	39,939,000
1933	117,780,000	146,208,000	31,754,000
1931	137,400,000	158,337,000	41,250,000
1929	250,504,000	302,864,500	111,720,800
1927	197,353,000	225,931,600	80,974,200
1925	189,345,200	242,126,500	105,625,900
1923	163,686,900	226,555,100	106,079,600
1921	96,247,300	95,656,500	101,652,400
1919	158,091,000	160,271,000	175,688,000

No separate data on the manufacture of tire fabrics in cotton mills of the U. S. is available for 1914 or prior factory canvasses.

General Group to Venezuela

Fourteen representatives of the General Tire & Rubber Co, Akron, and their families, headed by Harry Conroy, sailed on February 14 aboard the *S.S. Santa Paula* for Venezuela where the company has a management contract with a Venezuelan concern whose plant is under construction.

Chief Imports in 1939

Of the total imports into the United States of $2,276,294,000 in 1939, crude rubber accounted for $178,489,000, or 7.8% of the grand total, according to the Foreign Commerce Department of the Chamber of Commerce of the United States, Washington, D. C. The next three products were coffee, which amounted to $139,574,000 (6.1%); cane sugar, $124,649,000 (5.5%); and raw silk, $120,852,000 (5.3%).

Seiberling Appeals Davis Decision

Frank A. Seiberling, founder and chairman of the Seiberling Rubber Co., filed notice of appeal in the Appellate Court of Cleveland on February 26 against dismissal of the suit he brought against Edgar B. Davis in an attempt to recover assets of the Ohio Goodyear Securities Co., a holding company. This company was set up in 1927 in connection with a $500,000 loan made by Davis to Seiberling. The lower court had ruled that "no trust was established" when certain assets were transferred to the new company and therefore Mr. Seiberling had no right to recovery. No decision on the appeal has yet been made.

Use of Duramin Announced

Duramin, a product of the laboratories of the B. F. Goodrich Co., described as "a combination of chemical age-resisters," will be used in the company's 1941 Silvertown tire line, it has been announced by John L. Collyer, president. Duramin, a statement says, acts on rubber to keep it "tough and alive," much as vitamins act on the human system. So potent is the new material, the statement continues, that it is effective in minute amounts, the quantity used in tires ranging from ¼ of 1% to 2% of the rubber compound.

KOROSEAL FILM IS DEVELOPED BY GOODRICH TECHNOLOGISTS

The development of a method of processing Koroseal, the synthetic thermoplastic material, into a transparent and highly durable film with wide industrial applications, has been announced by the B. F. Goodrich Co., Akron. The film development is the seventh major product field invaded by Koroseal. It was made possible by the development of a special processing machine.

Unlike other films, Koroseal film is resistant to outside exposure—sun, oxygen, and extremes and changes of temperature, according to Dr. H. E. Fritz, sales manager of the company's synthetics division. In addition, it is said to be extremely water and moisture-resistant. The film is already being produced in gauges ranging from 1/1000th of an inch and up, in a variety of colors in transparent, semi-transparent and opaque forms.

While the chief uses of the film are in waterproofing and packaging materials, its chemical inertness, flame resistance, and electrical properties make it valuable for laminating chemical containers for holding acids and corrosives and for insulating fine electric wire and cable, Dr. Fritz said. Other more obvious adaptations, he added, are rain-wear garments of all kinds, shower curtains, window draperies, aprons, and refrigerator bags and food coverings.

Brazilian Research Laboratory

Based on the expressed interest of rubber goods manufacturers in Brazil, a new division on rubber has been created in the Instituto Nacional de Technologia in Rio de Janeiro, and the necessary equipment for the operation of a research laboratory is being installed. Contributions for the purchase of this equipment were made not only by Brazilian firms, but also by American concerns, including Goodyear and Firestone.

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FINANCIAL NEWS

GOODYEAR TIRE & RUBBER CO. REPORTS NET OF $10,309,788

A net profit of $10,309,788, after depreciation, interest, subsidiary dividends, Federal income taxes, and $1,000,000 reserve for contingencies, is reported for 1940 by the Goodyear Tire & Rubber Co., Akron. This compares with a net profit of $9,838,797 reported for the previous year, after deducting $1,791,602 foreign exchange adjustment.

After allowing for dividend requirements on the $5.00 preferred stock, the 1940 net is equal to $3.44 a share on 2,059,168 common shares, excluding 2,288 shares in the treasury, which compares with $3.20 a common share in the previous year. Net sales in 1940 increased by $17,438,375 to $217,540,079. Domestic payrolls for the year were more than $4,600,000 higher than in 1939, and an average of 2,200 more persons were employed in factory operations.

Current assets on December 31, 1940, amounted to $120,313,776 and current liabilities to $22,245,746, which compares with $109,251,502 and $17,515,813, respectively, at the end of 1939. The report shows that in addition to its normal business of manufacturing tires, tubes, mechanical goods and other rubber products, the company is now engaged in the production of a variety of materials for national defense, including bullet seal tanks, pneumatic life rafts, barrage balloons, and bullet seal inner tubes.

In connection with the report, P. W. Litchfield, chairman of the board, forecast a high level of business for 1941. He announced that the tonnage of goods produced in 1940 was higher than that of any year in the company's 42 year history.

Commenting on the crude rubber situation, Mr. Litchfield said: "There has been excellent cooperation on the part of the United States, British and Dutch Governments with the manufacturers and planters. The price of crude rubber has held relatively stable throughout the year. The total stocks of crude rubber now on hand in the United States represent about a six months' supply for the industry, with a substantial improvement forecast during the coming months.

"Although there is plenty of rubber available in the primary markets, quite recently the shipping situation has become acute, and we will require considerable additional American flag ships assigned to the rubber carrying trade to take care of American consumption and to build up an adequate reserve.

"Our own plantations shipped to us 33,000,000 pounds of crude rubber in 1940 as compared with 22,000,000 pounds in 1939. This produced a profit of $1,205,000 after absorbing $1,411,000 income and defense taxes paid to the Netherlands Indies Government.

"Owing to the possibility of interference with the national crude rubber supply, we have been giving additional attention during the past year to the production and use of synthetic rubber. A small pilot plant which has been in operation is being supplemented by another small commercial plant, which is now under construction.

"Owing to the relatively higher cost of synthetic rubber as compared to the production cost of natural rubber, any investments of a large scale for the production of synthetic rubber for the national interest should largely be borne by the Government."

Rome Cable Corporation

Fourth Quarter: Unaudited report indicates net profit of $107,513, equal to 57c a share on 189,830 capital shares, which compares with $100,755, or 53c a share, in the preceding quarter, and $102,216, or 54c a share, in the corresponding quarter of 1939. For the nine months ended December 31, 1940, the company earned $268,838, or $1.42 a share, against $217,300, or $1.14 a share, for the corresponding period of the previous year. The fiscal year ends on March 31.

Thermoid Company

For 1940: Net income of $602,740, after interest, amortization, minority interest and $50,000 reserve for possible excess profits tax, which after dividend requirements on the $3.00 cumulative convertible preferred was equal to $1.01 a share on 476,388 shares of $1.00 par common stock. Net income for 1939 was $432,304, or 65 cents a common share.

Raybestos-Manhattan, Inc.

For 1940: Net income of $1,696,926, or $2.70 a share, after providing $911,821 for depreciation and $886,500 for state and Federal income and defense taxes, and the excess profits tax. Total assets at the year-end amounted to $19,821,318, including $11,161,719 of current assets, equivalent to five times the current liabilities.

Mohawk Rubber Company

For 1940: Net profit of $66,845 as compared with $301,782 in the previous year. The balance sheet shows assets at the year-end were more than three times all indebtedness, including some debentures. Ratio of current assets to current liabilities was approximately 8 to 1. All officers and directors of the company have been re-elected.

GOODRICH AUDITED REPORT SHOWS PROFIT OF $6,121,357

Net earnings of $6,121,357 for 1940, equal to $3.11 per share on 1,303,255 shares of common stock after deducting the regular $5.00 per share dividend on the preferred stock, are reported by the B. F. Goodrich Company in an audited report. A preliminary statement of income, not certified, was released by the company early last month and was reported on in our previous issue. In 1939 net earnings totaled $6,628,747 or $3.50 a common share.

Consolidated profits for 1940, the report shows, amounted to $8,321,357 after all charges but before provision for Federal income taxes of $2,200,000, which compares with $7,828,747 in the prior year. Consolidated net sales increased 7.1% to $145,354,278 from $135,735,562 in 1939. Selling, general and administrative expenses, however, were reduced from $33,778,386 in 1939 to $32,614,847 in 1940. Inventories at the year-end amounted to $41,455,652, an increase of $4,216,269 for the period.

Stating that Goodrich joined with others in the industry in cooperating with the government to augment reserve stocks of crude rubber, the report, which was signed by David M. Goodrich, chairman, and John L. Collyer, president, said that on February 1, 1941, government reserves were reported at 134,000 tons while manufacturers' and dealers' stocks stood at 206,500 tons. All stocks afloat totaled 153,000 tons. The total of 493,500 tons of crude rubber on hand and afloat was equivalent to 7.7 months' supply at the rate of January, 1941, consumption.

In an illustrated product booklet accompanying the report the statement was made that as the key to unfailing supplies of an essential raw material, synthetic rubber must be considered in terms of the time required to attain tremendous productive capacity. To create facilities of the capacity required to replace the 600,000 tons of natural rubber the nation uses annually would take a minimum of three years, according to this statement. Even stand-by plants capable of rapid emergency expansion could be built only in from 18 to 24 months, it was said.

U. S. Rubber Declares Dividends

After a lapse of twenty years, the United States Rubber Company has declared a dividend on its common stock. The dividend, amounting to 50c per share, was voted by the board of directors on March 5. The last previous common dividend was paid by the company on April 30, 1921. A dividend of 2% on the outstanding 8% non-cumulative first preferred stock was also voted. Announcement of the common dividend climaxes a near-miracle in modern American industrial history, which is detailed elsewhere in this issue.

CANADIAN NEWS

The Dominion government has reached into the executive ranks of the Canadian rubber industry in order to fill one of the most important war posts at Ottawa. This became known recently when the Goodyear Tire and Rubber Company, Ltd., New Toronto, Ont., announced the loan of its general manager and treasurer, Richard Coulton Berkinshaw, to the government for the duration. Mr. Berkinshaw has been drafted for the position of Director General of Priorities for the Department of Munitions and Supply. He is the second ranking Goodyear executive to go into active war service. O. H. Barrett, secretary and general counsel, is now overseas with the First Division as a Lieutenant Colonel on the headquarters staff.

This is the second of Canada's wars in which Mr. Berkinshaw has played an important part. Immediately after his graduation from Osgoode Hall Law School, in Toronto, in 1916, he went overseas with the 124th Battalion, was mentioned in despatches, and returned as major of the 12th Battalion, Canadian Engineers.

Herbert Horsfall, president and managing director of the Canada Wire and Cable Co., Ltd., was elected to the board of the Toronto General Trusts Corporation at the recent annual meeting. Mr. Horsfall is also a vice-president of Lake St. John Power and Paper Company and a director of Fleet Aircraft and of the St. Lawrence Corporation.

Additional expansion has recently been announced by two Canadian rubber companies. The Dunlop Tire and Rubber Goods Co., Ltd., Toronto, has been granted a sum of $157,325 by the Department of Munitions and Supply for capital expenditures at its Toronto plant. The B. F. Goodrich Rubber Co. of Canada, Ltd., is erecting a 120 by 22 foot addition of brick and steel construction at its Kitchener plant. The addition will consist of one story and mezzanine only and is for the purpose of housing a new 84-inch vulcanizer. The company is planning the production of 56-inch sixteen ply airplane tires which require a larger heater than any presently available. These will be the largest airplane tires manufactured in the Dominion. The addition is scheduled to be ready for use on March 15.

Statistics on Quebec's forty leading industries which have just been released by the Department of Trade and Commerce and Municipal Affairs, Montreal, place the rubber goods industry in twenty-fourth position in this province. The figures are for the year of 1938 which is the latest year for which complete data is available. A total of fourteen companies capitalized for an aggregate of $11,176,046 are listed. The data show that these employed 3,597 workers, paid $3,021,636 in salaries and wages, and produced $11,584,648 worth of goods.

Crude rubber imports into Canada showed almost a threefold increase for the month of December compared with the same month of the previous year. Imports amounted to 16,321,954 pounds as against 6,218,159 in 1939. For the entire year of 1940 the Dominion imported a total of 113,773,959 pounds of crude, an increase of 62% over the previous year when only 70,212,487 pounds were brought in.

The list of contracts in excess of $5,000 granted by the War Supply Board, Ottawa, to rubber companies during the month of January, 1941, shows a decided increase in the number of smaller companies participating. In several cases the contracts awarded to the smaller organizations have been of sizable proportions. The list follows:

For the week ending January 10: for clothing, Tower Canadian, Ltd., Toronto, $58,125; Canadian General Rubber Co., Galt, Ontario, $48,911; Dominion Rubber, $23,409; for ordnance, Dominion Rubber, Kitchener, $109,296. For the week ending January 17: for clothing, Kaufman Rubber Company, Ltd., Kitchener, $72,450; Miner Rubber Co., Ltd., Granby, Que., $13,125; for personal equipment, B. F. Goodrich, $15,192. For the week ending January 24: for clothing, Dominion Rubber, $353,610; Northern Rubber Co., Ltd., Guelph, Ont., $34,358; Goodrich, $8,996; Granby Elastic Web of Canada, Ltd., Granby, Que., $7,889. For the week ending January 31: for clothing, Kaufman Rubber, $19,584; for land transport, Goodyear, $481,225; Dunlop, $154,680; Firestone, $101,517; Dominion, $63,030.

Canada Wire and Cable Company, Ltd., has announced payment of the regular quarterly dividend of $1.62 a share on the preferred stock on March 15. At the same time a dividend of $1 a share will be paid on the class A common shares and an interim dividend of $0.50 will be paid on the class B common shares.

As predicted in the January issue of RUBBER AGE the Dunlop Tire and Rubber Goods Company, Ltd., has shown a very substantial increase in operating profits for the year 1940. The annual statement just released reports a gross profit of $568,495 for the year compared with $447,682 for 1939.

However, net profits were so reduced by the sharp increase in income and excess profit taxes and in the amount set aside for depreciation that the company's net profit amounted only to $146,584, compared with $223,902 for the previous year. This is equivalent to $4.44 on the preferred shares in contrast to $6.80 a share in 1939.

After payment of the regular preferred and common dividends the company had a surplus for the year of $77,016 which added to previous surplus resulted in a $317,650 surplus being carried forward. Current assets shown in the statement total $3,380,675 and current liabilities amount to $923,059 leaving a working capital of $2,457,616 compared with $2,406,953 for 1939.

Canadian Lastex, Ltd., an associated company of Dunlop's, also reports having had a sucessful year. No dividend has yet been paid on the common stock, of which Dunlop holds half, but earnings have been more than enough to meet all debenture interest and sinking fund requirements.

R. C. Berkinshaw

who has been loaned to the Canadian Government as Director of Priorities for the Department of Munitions and Supply for the duration.

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OBITUARIES

Ira J. Cooper

Ira J. Cooper, treasurer of the Biltmore Manufacturing Company of Cincinnati, manufacturers of seat cushions, and founder of the Cooper Corporation, now a subsidiary of the Master Tire & Rubber Corp., was found dead in his automobile in Mt. Airy Forest, near Cincinnati, on February 26, with a bullet wound in his right temple. Death was self-inflicted due to an "incurable ailment." He was 67 years of age.

Born in Verona, Ohio, on October 12, 1874, Mr. Cooper was educated in the public schools of that town, and began his business career as a salesman for Morgan & Wright in Chicago. At the turn of the century he established the I. J. Cooper Co., pioneer auto accessory firm in Cincinnati, and a few years later he bought the Giant Tire & Rubber Co., which today is also a subsidiary of the Master Tire concern. In 1904 he established the Cooper Corporation, operating factories at Findlay and Madisonville, Ohio. His business platform was "good merchandise, fair prices and a square deal."

John K. Reckford

John King Reckford, president of the American Lead Pencil Co., Hoboken, N. J., died of pneumonia on February 20 in Mount Sinai Hospital in New York City where he had undergone an emergency operation several days previous. He was 46 years of age.

Born in New York City, Mr. Reckford attended Bovee School and Lawrenceville Academy and was graduated in 1915 from the Sheffield Scientific School of Yale University. When the United States entered the World War he was commissioned a lieutenant of aviation in the Navy and engaged in engineering work in the construction of aircraft factories. He was a member of the Naval Reserve at his death.

Associated with American Lead Pencil in an executive capacity for twenty-seven years, Mr. Reckford became its president six years ago. Prior to that appointment he had been secretary of the company. His father had also been president of the concern for a number of years. He leaves a widow.

John T. Neary

John T. Neary, pioneer rubber manufacturer, died in Miami Valley Hospital, Dayton, Ohio, on February 22, after a long illness, at the age of 76. He had been retired for twenty years and had made his home with his daughter, Mrs. John Q. Sherman, in Dayton. Born in New York City, Mr. Neary lived in Chicago for many years where he first engaged in the production of rubber goods. Later, he moved to Kokomo, Indiana, where he operated the Kokomo Rubber Works until his retirement. He was a member of the Knights of Columbus. He leaves his daughter and three sons.

Mrs. Ray A. Graham

Mrs. Ray Austin Graham, of McLean, Virginia, only daughter of Mrs. Harvey Firestone, Sr., and the late Harvey Firestone, Sr., founder of the Firestone Tire & Rubber Co., died of a streptococcus infection in a Washington, D. C., hospital on February 12. She was stricken ill only a few days earlier. Mrs. Graham was married on September 3, 1938, at Akron, Ohio. Burial was at Columbiana, Ohio. Her husband and one child survive.

Julien F. Cullen

Julien F. Cullen, for many years superintendent of the Gillette Rubber Co., at Eau Claire, Wisconsin, and for the past five months assistant superintendent of the Mansfield Tire & Rubber Co., Mansfield, Ohio, died in the Mansfield General Hospital on February 21 at the age of 50 due to a heart ailment. At one time he served as factory manager for Kelly-Springfield at Cumberland, Md.

According to an announcement from the American Cyanamid Company, America's first commercially built electron microscope, which enables scientists to picture minute objects at 100,000 times natural size, is now being operated at the Stamford, Conn., laboratories. Built by the RCA Research Laboratories, it is believed that the unique features of the electron microscope will be applied to rubber research among other materials.

Twelve new tires, six for passenger cars and six for trucks, have been announced for 1941 by the Fisk Tire Division of U. S. Rubber. Two new Safti-Flights, one engineered for rayon and the other for cotton, top the passenger car line. In addition, three new passenger car tubes, including the Safety-Sealer which seals punctures up to the size of a ten-penny nail, and two truck tubes were announced.

Plans to convert the old building of the Akron Library into a rubber museum, proposed several months ago, after the new building is occupied, have been discarded, according to the Akron Chamber of Commerce, original proponent of the plans.

RUBBER EXPORT QUOTA SET AT 100% FOR SECOND QUARTER

Meeting in London on February 25, the International Rubber Regulation Committee continued the rubber export quota for the second quarter of the current year at 100% of basic quotas in order to meet "special requirements" of the United States. The requirements referred to are the stockpiles of crude rubber being amassed for emergency purposes by the U. S. Government.

The action of the committee was generally expected, in view of the fact that the U. S. Government is committed to purchase at least 180,000 tons during 1941, providing the market price is kept within the limits set in the agreement between the Rubber Reserve Company and the Regulation Committee.

Goodyear to Make Plane Parts

Announcement was made early this month by P. W. Litchfield that the Goodyear Aircraft Corporation will immediately build a new factory in Akron for the construction of "fighting airplane" parts. The announcement culminated rumors that Goodyear, Chrysler and Glenn L. Martin would participate in a three-way program to turn out the formidable Martin bombing planes on a mass production basis. Goodyear will make tail surfaces, wings and fuselages; Chrysler will make motors; and Martin will assemble the parts at its new plant in Omaha, Nebraska. The new Goodyear factory, which will be located near the Akron Airport, will employ 5,000.

Amsco-Solv Aromatic Solvents

A new series of petroleum solvents of high aromatic content, called Amsco-Solv, has just been brought out by the American Mineral Spirits Co., 230 N. Michigan Ave., Chicago, Ill. They are available in five different evaporating ranges to meet various requirements, as follows: "A" can be used as a replacement for toluol; "B", replacement for xylol; "C" and "D", for incidental solvent uses; and "E" as a substitute for heavy coal tar products as a softener and solvent for reclaimed rubber. A descriptive folder containing technical data and a chart of evaporation rates is available from the manufacturers.

Bauer & Black and the Lewis Manufacturing Co., both operating in the surgical dressing field as divisions of the Kendall Company, have been consolidated. Headquarters will be maintained at 2500 S. Dearborn St., Chicago, present address of Bauer & Black. R. A. Whidden continues as president, C. K. Perkins as general sales manager, and H. B. Crow as sales manager.

LOS ANGELES NEWS

The officers and staff of the West American Rubber Company held a "God Speed and Safe Return" dinner party at the Jonathan Club, Los Angeles, on Tuesday, February 18, for Henry H. Vickrey, secretary-treasurer of the company, who has returned to active duty as colonel of the 160th Infantry.

Colonel Vickrey entered the office of this rubber company at the close of the last war more than 22 years ago. During that period he worked up to the position he held on his recent departure for camp. Charley Lamb, general manager, says he richly earned the respect of all those associated with him. The colonel always found time to keep in active touch with army work and he devoted his spare time to special courses in military training and maneuvers.

"The West American Rubber Company," says Mr. Lamb, "is proud to have opportunity to make this contribution to the national cause. Colonel Vickrey's absence will be felt keenly in our business but we all know full well that when he returns he will return with the inner knowledge of a task well done"

One of the largest press parties and best attended dealer luncheons to be held in the United States by the Goodyear Tire and Rubber Company in its series of meetings throughout the country, with the purpose of educating the dealers to the vast amount of work being done by Goodyear in the national defense program, was held at the Ambassador Hotel on Friday, February 21. The dealers were entertained in three groups, approximately 500 attending. The moving picture shown on such occasions was shown three times during the day. The exhibits attracted very close attention. Among top officials of the company present were P. W. Litchfield, L. E. Judd, E. J. Thomas and H. E. Cameron. Among local executives were F. A. Steele, J. E. Mayl, H. G. Harper and R. S. Wilson.

Officials of the Golden State Rubber Mills are proud of an order of considerable size just received from South Africa for Fit-Rite occluders, a rubber patch device covering the eye without precluding the use of glasses. A new item manufactured by this company, to be used largely as a premium, is a rubber key-case the feature being that the keys when not in use slip into a small rubber container and so do not wear out the pocket in which the keys are carried.

Marvin Stone, in charge of production at the Mihm Rubber Company, 1172 East Slauson Avenue, has word from his son, Billy Stone, amateur lightweight boxer, now making a record at Van Wert, Ohio. Billy made a record both in Kansas City and Los Angeles before going to Ohio where he is employed by the Atlantic and Pacific stores.

Bill Holmes, general sales manager for the Dill Manufacturing Company, formerly in charge of the office of that company here, now located in Cleveland, Ohio, spent several days in Los Angeles during the last month and was able to attend the March meeting of the Los Angeles Rubber Group.

E. L. Kennedy, proprietor of the Mihm Rubber Company, 1172 East Slauson Avenue, has established a metered electric washing machine rental business in connection with his plant. The rentals are largely to apartment occupants who have no home laundry facilities. A dime in the meter automatically opens up electric power current for a given length of time. A complete repair service is maintained as a feature of the business.

The Darnell Corporation in Long Beach has had its manufacturing facilities held up to a large extent for a month by a strike of rubber workers. What work that has been done in the meantime has been done by salaried men and others taking on extra burdens.

Phil Ritter of the U. S. Rubber Company is quite seriously ill in a Los Angeles hospital. He is improving, however, but it will be a couple of months, it is thought, before he can resume full time active duties.

The regular meeting of the U. S. Rubber Club, a club made up of the office and executive personnel of the U. S. Rubber Company, was to be held in the club house at the Montebello Golf Club on Saturday, March 15. Reservations indicated an attendance of approximately 110 people. Dick Behrman is president of the group.

R. E. Sheahan, general manager of the tire division of the U. S. Rubber Company, whose home is in Detroit, was in Los Angeles for a few days in February. Mr. Sheahan and his wife had been making the swing around the circle. They had sailed from New York to Havana, then through the Panama Canal and up the west coast to Los Angeles.

Col. Henry H. Vickrey

Secretary-Treasurer of West American Rubber who has returned to active duty with the 160th Infantry.

Expands Production Facilities

Increased demand for its diversified "Pioneer" brand asphalt products has made it necessary for Wishnick-Tumpeer, Inc., to greatly increase manufacturing facilities at both its Chicago and Lawrenceville, Ill., plants. The production potential at Chicago has been doubled with the installation of additional still capacity, while storage capacity has been tripled. Additional still capacity at Lawrenceville will increase output approximately 70%, while new tankage will double the storage capacity.

Another Factory for Cuba

Still another new rubber manufacturing factory is planned in Cuba. The Companhia Hulera Euzcadia, S.A., of Mexico, has purchased land, building and equipment near Havana and expects to begin production within six months, according to the American Consulate General at Havana. Tires, tubes and footwear will be made, as well as some mechanical goods. The factory at Matanzas, reported in an earlier issue, is expected to get into production shortly.

Doubling Thiokol Production

The Dow Chemical Company is erecting a new factory unit at Midland, Michigan, which will double the capacity for the production of Thiokol, made by the company for the Thiokol Corporation of Trenton, N. J. Operation of the new unit, said to have been made necessary by increased business, is expected to start shortly.

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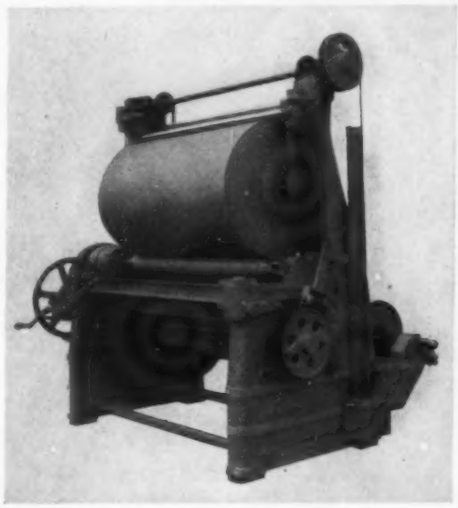
NEW EQUIPMENT

Johnstone Slitter and Rewinder

Two new models of the slitter and rewinder machine manufactured by the Johnstone Engineering & Machine Co., Downington, Penna., known as the Johnstone Twelve and Fourteen, respectively, have been introduced. These machines, which slit and rewind fab-



rics of all kinds, including rubberized fabrics and imitation leathers, with straight, pinked or special edges, take rolls of 32 to 62-inch width. Speeds depend on the material handled and the width of the roll, maximum being 700 feet per minute. Standard equipment includes ten slitter levers. Standard slitters can be spaced on ½-inch centers. Special spacers are made to suit individual requirements. The new models are completely modern in all details. Features stressed by the manufacturers include sealed slitters, underpoint springs, gliding pressure adjustment, boomerang pressure release lever, drum winder, dual purpose clutch control, floating pressure roll drive, and one-handed pressure roll elevator.

Albert Laboratory Mill

A new laboratory mixing mill for the rubber, plastic and allied fields has been introduced by L. Albert & Son, of Trenton, N. J., and Akron, Ohio. It is of the top cap housing type, the housings being cast integral with the base so that no misalignment can occur. All the bearings are full brass lined. The gears are machine cut with herringbone drive gear and pinion. Guides are of two-piece construction and are adjustable to move with the rolls. Back bearings are held in place by hold-back bolts through the rear of housings. The mill is furnished with spur gear reduction and any standard friction ratio connecting gears. Other features include a safety mechanism that stops the rolls almost instantaneously, a self-contained motor, and a magnetic type brake. The mill occupies a floor space of approximately 40 x 30 inches, and is said to be quiet in operation.

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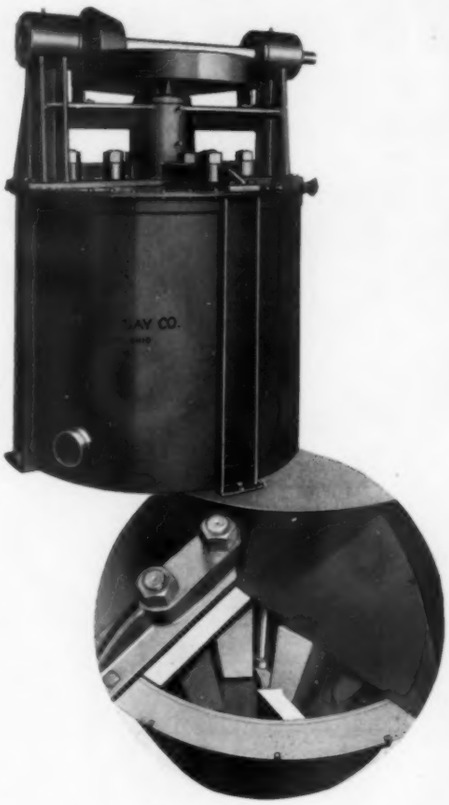
Day Rubber Cement Mixer

Illustrated herewith is the Hero type of rubber cement mixer recently introduced by the J. H. Day Co. Cincinnati, Ohio, which, according to the manufacturers, requires much less time for dissolving a batch



than does the older type. Four sets of stationary blades, spaced at 90 degrees, extend downward from the top frame of the new mixer. Two sets of blades, spaced at 180 degrees, extending upward from heavy agitator arms located at the bottom of the vertical shaft, rotate with the shaft. The insert shows the blade section of the mixer and illustrates the close clearance between the stationary and moving blades, which shear the rubber into smaller and smaller pieces, constantly exposing more surface to the action of the solvent.

Double Rotor-Positive Pressure Mixer

A double rotor-positive pressure mixer for rubber, plastics and other materials, has been developed by Lancaster Processes, Inc., 620 Fifth Ave., New York City. Horizontal rotors in the mixer are arranged in a vertical plane so as to have the bite away from the feed chamber and the upper ram, thus eliminating high peak loads and ensuring better mixing as there is no tendency for unmixed material to stick to the ram. This arrangement, according to the company, provides greatly increased sidewall surface available for cooling, resulting in effective temperature control. The location of the bite permits the injection of water, gases, coloring media, etc., into the body of the ma-

66

DIXIEDENSED
KOSMOBILE

DUSTLESS CARBON BLACKS

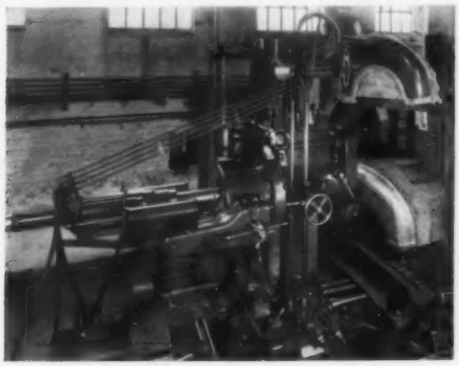
UNITED CARBON COMPANY
CHARLESTON, W. VIRGINIA

THESE FIGURES—THE *"QUALITY TWINS"* OF THE RUBBER INDUSTRY STAND FOR KOSMOBILE 66 AND DIXIEDENSED 66 WHICH, IN TURN, STAND FOR THE HIGHEST DEVELOPMENT IN BLACKS FOR RUBBER COMPOUNDING.

terial being processed at a point where rapid diffusion is assured. The discharge gate of the new mixer has a double function. It provides for the quick, uniform discharge of the processed material and permits increasing the batch size above the volume of the working chamber at the outset of the mixing operation, thus compensating for the shrinkage accompanying plasticization.

Turchan Mold Engraving Machines

Notable short-cuts in manufacturing are claimed for the mold engraving machines sold by the National Purchasing Co., Boulevard Building, Detroit, Mich., under the name of Turchan Followers, developed for the work of precision duplicating of dies, molds, patterns, rolls, etc. The machines are attachments to and made an integral part of standard mills, boring mills,



lathes and planers, and are said to increase the capacity and range of such machines without abridging or impairing the original function of the machine to which it is attached. Essentially, Turchan Followers are duplicators, following the pattern it is required to copy and transmitting and transferring to the cutting tools the control of the form to be cut. They trace the contour of the original die or mold and hold the cutting tools to the exact tolerances of the original.

Briefs . . . .

A 36-inch **ball bearing swing joint,** the largest ever made, was recently manufactured by the Chiksan Tool Co., Brea, California. Built especially for a Government project, the joint weighs 3,087 pounds and turns on 128 two-inch stainless steel balls arranged in two rows and turning in flame-hardened races.

•

A. Schrader's Son, Brooklyn, N. Y., has developed a new **Tire Valve Converting Tool.** The new tool eliminates the possibility of spoiled jobs and the costly practice of bending tire valves with a piece of pipe or a pair of pliers. It is small and compact and can be bolted anywhere along the edge of the work bench.

•

The addition of an **Infra Red-Film Dryer** to its line of spectrographic analysis equipment has been announced by the Harry W. Dietert Co., 9330 Roselawn Ave., Detroit, Mich. The new device will dry a 16-inch length of 35 mm. film in 50 seconds.

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1-A

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REVIEWS

BOOKLETS, CATALOGS, Etc.

1941 Packaging Catalog. Packaging Catalog Corp., 122 East 42nd St., New York City. 9 x 11¾ in. 586 pp. $2.50.

This is the 13th edition of what may properly be termed the encyclopedia of the packaging industries. Completely revised, it also contains much new matter never heretofore published in any form, including data dealing with package law and adhesives. Individual articles cover subjects not previously treated in separate articles, while particular recognition has been given to new developments in both materials and packaging techniques. The use of rubber derivative coatings in the packaging field is discussed in the section on wrappings and ties. There are 15 sections in all, each easily found by means of tabs, and 500 illustrations, including many basic charts and diagrams. As in the past, samples of fancy papers, ribbons, labels, wraps, ties, etc., add to the appearance of the catalog.

•

Santocure in Rubber Compounding for the Wire Industry. Rubber Service Department, Monsanto Chemical Co., Akron, Ohio. 8¾ x 11¼ in. 16 pp.

This is a supplement to Monsanto's booklet on "Rubber Compounding for the Wire Industry." It gives compounds and physical data dealing largely with the use of Santocure, the company's newest accelerator, activated with El-Sixty, although the use of the new accelerator activated with other accelerators is also shown. Combinations of Santocure and El-Sixty are said to make possible stocks that are exceptionally safe from the processing and storage angles and yet will cure fast enough to give high speeds on CV machines. These same combinations are also satisfactory for pan and drum curing. The compounds given cover jacket stocks, insulation for inner conductors of SJ cords, and telephone wire.

•

Parlon with Resins and Plasticizers. Hercules Powder Co., Inc., Wilmington, Delaware. 8½ x 11 in. 8 pp.

The most recent data from the Hercules Experiment Station on resins and plasticizers for use with Parlon, the company's chlorinated rubber (formerly called Tornesit), is given in table form in this booklet. Twenty-four resins, representing most of the types which are commercially available, were tested individually in a number of formulations. Thirteen plasticizers were similarly tested. Tests made included adhesion, sanding and polishing, hardness, elongation, cold-check resistance and resistance to chemicals and water, boiling water and direct ultra-violet light. The data is intended for the better production of lacquer-type coatings with particular characteristics.

•

The Romance of Rubber. (Revised.) United States Rubber Co., 1230 Sixth Ave., New York City. 7¼ x 8¾ in. 48 pp.

This brief history of both the rubber industry and the United States Rubber Co., the first edition of which was issued by the company many years ago to serve as a "guide book to the rubber industry," has been streamlined and brought up to date. After tracing the discovery and early use of rubber in chronological fashion, the booklet then takes the reader on a "visit to a modern rubber plantation," traces the production of rubber from seedling to bale, and then discusses the major uses of rubber in everyday life. It concludes with a brief history of the growth of the company since its formation in 1892.

Here Today. Travelers Insurance Co., Hartford, Conn. 6 x 9 in. 36 pp.

The eleventh in a series issued annually by Travelers Insurance, this booklet presents a comprehensive analysis of the facts about accidents in which 35,000 persons were killed and more than 1,300,000 others were injured in 1940. A composite picture of 1940's typical accident driver indicates that he was an experienced, middle-aged male and that he was driving a passenger car in good mechanical condition in clear weather during the early evening hours of a Saturday or Sunday. The booklet also includes statistics and editorials on such phases of the traffic problem as speed, pedestrian accidents, and the need for greater courtesy on the highways.

•

Guide to the Literature on Rubber. (Letter Circular LC626.) National Bureau of Standards, Washington, D. C. 8 x 10½ in. 34 pp. (Mimeographed.)

Superseding LC501, this Letter Circular contains a brief review of current books, periodicals, handbooks, pamphlets, Government documents and other publications relating to rubber. It also indicates some of the Government departments, societies, institutions and commercial organizations which conduct investigations on rubber and issue publications describing their work. The aim of the circular is to indicate sources from which information may be obtained, with special attention given to literature in which bibliographies and lists of references are obtainable.

•

Hercolyn and Abalyn. Hercules Powder Co., Inc., Wilmington, Delaware. 8½ x 11 in. 12 pp.

The properties and uses of Hercolyn and Abalyn, which are liquid esters of abietic acid, are discussed in the booklet. Data is given on ester content, refractive index, specific gravity, acid number, saponification number, color, viscosity, flash point, flame point, vapor pressure, boiling point, thiocyanate value, weight and specific rotation. Both of these resins find application in rubber compounding as softeners and tack-producing agents. They also aid in the dispersion of pigments and fillers. Typical emulsion formulations are included.

•

Eastern Mixing Equipment. Eastern Engineering Co., 45 Fox St., New Haven, Conn. 8 x 11 in. 24 pp.

Complete descriptions and illustrations of mixing equipment for all types of industrial applications are contained in this catalog. One section is devoted to engineering data relative to the selection and adoption of mixing machinery. Another section discusses fluid mixers in all sizes and types, ranging from 1/1000 h.p. to 25 h.p. A concluding section gives data on midget centrifugal pumps, sump pumps, air powered mixers, transfer pumps, and temperature controls.

•

What the American Chemical Society is Doing for Chemists and Chemical Engineers. American Chemical Society, Mills Building, Washington, D. C. 6 x 8½ in. 8 pp.

The basic principles of the American Chemical Society and the services it performs for the welfare of the chemist and chemical engineer are openly discussed in this pamphlet, the object of which is to encourage membership in the Society. An application blank is included on the back of which is reprinted that section of the Society's by-laws pertaining to membership.

•

Descriptions and illustrations of both the Standard Type and Super Type of **Johnson Friction Clutches** are included in a new catalog recently issued by the Carlyle Johnson Machine Co., Manchester, Conn.

•

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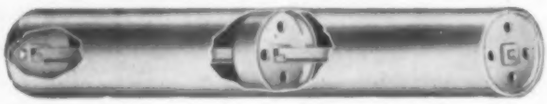

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The CARTER BELL MFG CO

CARTER BELL 1903 RUBBER SUBSTITUTES

Springfield New Jersey

REVIEWS (CONT'D)

Richards "55" Modern Machines. J. A. Richards Co., Kalamazoo, Mich. 4 x 9 in. 48 pp.

The wide and varied line of printing and die-making machinery and equipment featured by the Richards concern is illustrated and described in this booklet, cleverly die-cut in the form of a machine tool with geared teeth. Included is equipment used in the production of steel rule dies for the cutting of rubber parts and the trimming of flash on molded rubber goods, as well as equipment for the production of clicking dies which are used by manufacturers of molded or die-cut rubber parts. A history of the company is also given.

•

Preservation of Business Records. By Ralph M. Hower. Business Historical Society, Inc., Baker Library, Soldiers Field, Boston, Mass. 6 x 9 in. 56 pp.

This is a new edition of the pamphlet first issued in 1937, the supply of which was exhausted soon after publication. Taking advantage of the second printing, the author has added new and up-to-date information as well as incorporating the suggestions of business firms who used the first edition. Like the previous issue, the booklet tells why, what, how and when business records should be preserved, setting up a schedule which most firms can economically put into effect.

•

Report on the Progress of the W.P.A. Program. Federal Works Agency, Work Projects Administration, Washington, D.C. 8 x 10½ in. 147 pp.

The current report covers progress made in the W.P.A. program through June 30, 1940. It continues the series of statements which have reviewed the employment, accomplishments, and expenditures of the Work Projects Administration. Various sections of the report bring earlier accounts of major aspects of the program up to date, while a new and special section covers activities of the Project designed to strengthen national defense.

•

Torflex Flexible Bearings. (Bulletin 128-2). Harris Products Co., 5411 Commonwealth Ave., Detroit, Mich. 8½ x 11 in. 4 pp.

The various types of flexible bearings made by the company are illustrated and described in this new bulletin. The bearings, which are recommended, among other applications, for noise, vibration and lubrication elimination and for impact and shock absorption, are shown in a number of typical applications. Various types of testing equipment used by the company for the rubber portions of the bearings are also shown.

•

Amercoat Plastic Coatings. American Concrete & Steel Pipe Co., Los Angeles, Calif. 8½ x 11 in. 16 pp.

The diversified uses to which Amercoat, a new type of sprayable plastic coating which is corrosion-proof and non-contaminating, may be put in modern industry are outlined and discussed in this bulletin. The protection properties afforded by the new material are emphasized by illustrations showing commercial and industrial uses, such as in the form of a lining material for tanks, steel drums, and other containers, and as a surface protective for ships. Properties of Amercoat are given.

•

Carbon Black Fire Hazard. Godfrey L. Cabot, Inc., 77 Franklin St., Boston, Mass. 8½ x 11 in. 8 pp.

Reprinted from the December, 1940, issue of the *India Rubber World*, this booklet describes the results of test fires created under controlled experimental conditions at the Factory Mutual Test Station at Everett, Mass., to determine the fire hazard of carbon black. The data given corrects many misconceptions on the subject and proves that carbon black presents very little fire hazard.

MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, MARCH 10, 1941

Crude Rubber

SPOT rubber prices on the Commodity Exchange have followed an erratic course in the past thiry days, swinging in a 163 point range. High for the period was 21.75 (on March 6) and low was 20.12 (on February 11). Due to fears of a further curtailment in available vessels for rubber in the Far East and possibility of trouble with Japan, the price went to 20.87 on February 13, but easing of the tension brought it down to 20.37 on February 15. Renewed uncertainty on the Far Eastern situation and the reluctance of importers and dealers to sell, sent the price up to 21.20 on February 19, but again easing of the tension plus the announcement that the Regulation Committee was continuing the 100% quota for the second quarter of the year broke it sharply, 20.62 being quoted on February 25, 26 and 27. However, increasing concern over the availability of sufficient vessels to continue to bring rubber from the Far East at recent quantities caused an upward trend, which culminated in the 21.75 price on March 6. Uncertainty in the market continues. Quotations in the outside market, Exchange, London and Singapore, follow:

As of March 10

Plantations—

Ribbed Smoked Sheets—

No. 1 Spot	—	@	.21⅝
April	—	@	.21⅞
July-September	—	@	.21⅛
No. 2	—	@	.21⅜
No. 3	—	@	.21⅛
No. 4	—	@	.21⅞
Thin Latex Crepe	—	@	.22⅛
Thick Latex Crepe	—	@	.22
Brown Crepe, No. 1	—	@	.20⅞
Brown Crepe, No. 2	—	@	.20¾
Amber Crepe, No. 2	—	@	.20⅞
Amber Crepe, No. 3	—	@	.20¾
Brown Crepe, Rolled	—	@	.19¼

Latex—

Normal, per lb., carload lots	—	@	.26½

Paras—

Up-River, fine	—	@	.19¾
Acre Bolivian, fine	—	@	.20

Balata—

Brazilian block	—	@	.13

LONDON MARKET

Standard Smoked Sheets—Buyers—March 10

April	—	@	13 9/16d
July-September	—	@	13 5/8d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—March 8

April-June	—	@	10½d
July-September	—	@	9 31/32d

Scrap Rubber

Dealers report continued demand for practically all grades of scrap. Although stocks are believed sufficient at present, some scarcity is noted in certain grades. Prices have increased slightly on tube stocks since our last report. Current quotations follow:

(Prices to Consumers)

Auto tire peelings, ton	25.00	@	27.00
Mixed auto, ton	14.00	@	15.00
Beadless tires, ton	18.50	@	19.50
Clean solid truck tires, ton	32.00	@	34.00
Boots and shoes, ton	24.00	@	25.00
Arctics, untrimmed, ton	20.00	@	21.00
Inner tubes, No. 1, lb.	.09	@	.10
Inner tubes, No. 2, lb.	.05	@	.05¼
Inner tubes, Red, lb.	.05	@	.05¼

Reclaimed Rubber

Interest in reclaim continues at a high rate, with increasing demand evident in practically all branches of the rubber manufacturing industry. As the national defense program swings into higher tempo, still further demand is anticipated in the early future. Stocks are said to be reasonable. There has been no change in the price structure since our last report. Current quotations follow:

Shoe

Unwashed, lb.	.06½	@	.06¾
Washed, lb.	.10	@	.10¼

Tube

No. 2 (Compounded), lb.	.09	@	.10¼
Red Tube, lb.	.09½	@	.09¾

Tires

Black (acid process), lb.	.07	@	.07¼
Black, selected tires, lb.	.06	@	.06¼
Dark Gray, lb.	.09¼	@	.10
White, lb.	.12½	@	.14
Truck, Heavy Gravity, lb.	.05½	@	.06
Truck, Light Gravity, lb.	.07	@	.07½

Miscellaneous

Mechanical blends, lb.	.04½	@	.05

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3, lb.	.32½	@	.32¾
Peeler, carded, 23/4/3, lb.	.33½	@	.33¾
Peeler, carded, 15/3/3, lb.	.30½	@	.30¾
Peeler, carded, 15/4/2, lb.	.30½	@	.30¾
Peeler, carded, 13/3/3, lb.	.29½	@	.29¾
CHAFERS			
Carded, American, 1 3/16", lb.	.32½	@	.32¾
Carded, American, 1", lb.	.25½	@	.34

Cotton

Climbing slowly this past week, the price of middling uplands on the Exchange jumped sharply today (March 10) from 10.88 on the previous trading day to 11.11, high for the period. Futures rose 23 to 33 points on the same day, representing the biggest gain in several months. The passage of the Lease-Lend bill by the Senate was credited with opening advances, but the expectancy of better new crop prices based on a smaller acreage, delays in crop preparations, talk of higher Government loans, and pending proposals, including the Bankhead bill, aimed at giving growers parity income, were factors which aided considerably in the improvement. Since our last report, the price has swung in a 42 point range, low being 10.69 on February 15. Starting with 10.91 on February 11, it dipped to 10.69 a few days later, then went up to 10.93 and later to 10.97 (on February 25), dropped off because of liquidations and spurted today. Probable cotton acreage for the season has been estimated at 24,289,000 acres. Quotations for middling uplands on the Exchange follow:

	Feb. 10	March 10		
	Close	High	Low	Close
March	10.39	10.78	10.64	10.77
May	10.37	10.78	10.62	10.73
July	....	10.79	10.57	10.73

Sheetings

48x40	36 in.	5.50	lb.	—	@	.05¼
40x40	36 in.	6.15	lb.	—	@	.05
40x36	36 in.	6.50	lb.	—	@	.04⅞
48x48	40 in.	2.50	lb.	—	@	.10
48x48	40 in.	2.85	lb.	—	@	.09¼
56x60	40 in.	3.60	lb.	—	@	.08½
48x44	40 in.	3.75	lb.	—	@	.07¾

Ducks

Enameling (single filling), lb.	.30	@	.33
Belting and Hose, lb.	.29	@	—
Single filling, A grade, lb.	.13½	@	.14
Double filling, lb.	.14½	@	.15½

Closing Rubber Prices on New York Commodity Exchange, Inc.

"New" Standard Contract of 10 Tons

FROM FEBRUARY 11 TO MARCH 10

Date	Spot	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Contracts
Feb. 11	20.12	20.12	20.10	20.06	20.02	19.93	19.85	19.77	19.70	19.63	19.56	19.50	19.45	——	65
12	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
13	20.87	20.70	20.70	20.63	20.57	20.38	20.20	20.07	19.95	19.89	19.82	19.75	19.70	——	213
14	20.62	20.50	20.50	20.45	20.40	20.20	20.00	19.86	19.73	19.66	19.59	19.53	19.48	——	152
15	20.37	20.25	20.25	20.17	20.11	19.90	19.70	19.57	19.45	19.38	19.31	19.25	19.20	——	26
16	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
17	20.50	20.55	20.55	20.45	20.35	20.14	19.94	19.83	19.72	19.64	19.57	19.50	19.45	——	16
18	20.68	20.66	20.66	20.61	20.57	20.31	20.05	19.97	19.90	19.83	19.76	19.70	19.65	——	89
19	21.20	21.15	21.15	21.09	21.03	20.71	20.40	20.33	20.27	20.20	20.13	20.07	20.02	——	43
20	20.87	20.78	20.78	20.75	20.73	20.41	20.10	20.01	19.93	19.86	19.79	19.73	19.68	——	90
21	20.87	20.76	20.76	20.74	20.72	20.46	20.20	20.10	20.00	19.93	19.86	19.80	19.75	——	15
22	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
23	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
24	20.88	20.88	20.88	20.84	20.80	20.55	20.30	20.20	20.10	20.03	19.96	19.90	19.85	——	44
25	20.62	20.60	20.60	20.58	20.57	20.30	20.03	19.95	19.88	19.81	19.74	19.68	19.63	——	13
26	20.62	——	20.53	20.49	20.45	20.22	20.00	19.87	19.75	19.68	19.61	19.55	19.50	——	65
27	20.62	——	20.65	20.64	20.63	20.39	20.15	20.05	19.95	19.89	19.83	19.78	19.73	——	37
28	20.75	——	20.76	20.76	20.76	20.52	20.28	20.18	20.08	20.02	19.96	19.91	19.86	——	16
Mar. 1	20.75	——	20.75	20.70	20.70	20.45	20.20	20.10	20.00	19.94	19.88	19.83	19.78	19.73	3
2	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
3	20.70	——	20.70	20.67	20.65	20.42	20.20	20.08	19.97	19.91	19.85	19.80	19.75	19.70	5
4	21.15	——	21.05	20.02	21.00	20.71	20.42	20.30	20.20	20.13	20.06	20.00	19.95	19.90	27
5	21.37	——	21.12	21.09	21.06	20.80	20.55	20.40	20.25	20.16	20.08	20.00	19.95	19.90	31
6	21.75	——	21.70	21.67	21.65	21.32	20.99	20.82	20.65	20.55	20.45	20.35	20.15	20.05	143
7	21.62	——	21.35	21.32	21.30	21.00	20.70	20.50	20.30	20.23	20.16	20.10	19.90	19.80	43
8	21.25	——	21.25	21.20	21.15	20.87	20.60	20.37	20.15	20.08	20.01	19.95	19.75	19.65	72
9	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
10	21.50	——	21.45	21.42	21.39	21.07	20.75	20.55	20.35	20.28	20.21	20.15	19.95	19.85	19

CHEMICAL MARKETS

New York, Mar. 10, 1941
All Prices F.O.B. Works

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.24 @	.30
A-10	lb.	.31 @	.35
A-11	lb.	.52 @	.65
A-19	lb.	.52 @	.65
A-32	lb.	.70 @	.80
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.55 @	.60
Beutene	lb.	.70 @	.75
Butyl Zimate	lb.	— @	2.15
Captax	lb.	.50 @	.55
Crylene	lb.	.40 @	.47
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.36
El-Sixty	lb.	.50 @	.65
Ethyl Zimate	lb.	— @	2.15
Ethylidene aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.31 @	—
Guantal	lb.	.40 @	.50
Hepteen	lb.	.35 @	.40
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.13 @	—
Witco	lb.	.15 @	—
Monex	lb.	— @	2.00
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	2.50 @	—
Pipsolene	lb.	1.55 @	1.85
R & H 50-D	lb.	.42 @	.43
R-2	lb.	1.40 @	1.80
R-2 Crystals	lb.	2.50 @	2.75
R-23	lb.	.40 @	—
RN-2	lb.	1.40 @	1.80
RN-2 Crystals	lb.	2.00 @	2.25
Rotax	lb.	.60 @	.65
Safex	lb.	1.20 @	1.30
SPDX	lb.	.70 @	.75
Super-Sulphur No. 1	lb.	.50 @	—
No. 2	lb.	.18 @	.20
Thiocarbanilid, drums	lb.	.24 @	.30
Thiurad	lb.	— @	2.35
Trimene	lb.	.55 @	.65
base	lb.	1.05 @	1.20
Triphenylguanidine	lb.	.45 @	—
Tuads	lb.	— @	2.00
Ulto	lb.	1.25 @	1.75
Ureka	lb.	.60 @	.75
Blend B	lb.	.60 @	.75
Blend C	lb.	.56 @	.65
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—
Zimate	lb.	— @	2.00
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Next Column)			
Blues			
Prussian	lb.	.33 @	—
Ultramarine	lb.	.11 @	.16
Browns			
Mapico	lb.	.11 @	—
Umber, Turkey	lb.	.04½ @	.05
Greens			
Chrome	lb.	.21 @	.30
Guignet's Green	lb.	.70 @	—
Reds			
Antimony crimson, 15/17	lb.	— @	—
sulfur, free	lb.	— @	—
Indian	lb.	.08¾ @	—
Domestic (Maroon)	lb.	.11 @	—
Mapico	lb.	.09¼ @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red	lb.	.09¼ @	—
Whites			
Cryptone No. 19	lb.	.05¼ @	.05½
Cryptone CB No. 21	lb.	.05¼ @	.05½
Cryptone ZS-86	lb.	.07¾ @	.08
Cryptone ZS-230	lb.	.07¾ @	.08
Cryptone ZS-800	lb.	.07¾ @	.08
Lithopone:			
Albalith	lb.	.0385 @	.0410
Azolith	lb.	.0385 @	.0410
Ray-bar	lb.	.05½ @	.05¾
Ray-cal	lb.	.05¼ @	.05¾
Rayox	lb.	.13½ @	.14¼
Titanox A	lb.	.13½ @	.13¾
Titanox B	lb.	.05½ @	.05¾
Titanox C	lb.	.05¼ @	.05½
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.06½ @	.06¾
Anaconda, lead free	lb.	.06½ @	.06¾
Horsehead Lead Free Brand:			
Special—3	lb.	.06½ @	.06¾
XX Red—4	lb.	.06½ @	.06¾
XX Red—72	lb.	.06½ @	.06¾
XX Red—78	lb.	.06½ @	.06¾
XX Red—103	lb.	.06½ @	.06¾
Kadox, black label—15	lb.	.06½ @	.06¾
Red label—17	lb.	.06½ @	.06¾
St. Joe, black label	lb.	.06½ @	.06¾
green label	lb.	.06½ @	.06¾
red label	lb.	.06½ @	.06¾
U. S. P.—7. bbls.	lb.	.09½ @	.09¾
Zinc Oxide—French Process:			
Florence White Seal—7 bbls.	lb.	.08½ @	.08¾
Green seal—8	lb.	.08 @	.08¼
Red seal—9	lb.	.07½ @	.07¾
Yellows			
Cadmolith	lb.	.50 @	.55
Chrome	lb.	.13½ @	.18½
Mapico	lb.	.06¾ @	—

BLACKS
(In bags, carload lots)

Aerfloted Arrow	lb.	.02925 @	—
Certified	lb.	.02925 @	—
Certified Spheron	lb.	.02925 @	—
Continental	lb.	.02925 @	—
Disperso	lb.	.02925 @	—
Dixiedensed	lb.	.02925 @	—
Dixiedensed 66	lb.	.02925 @	—
Excello	lb.	.02925 @	—
Fumonex	lb.	.03 @	—
Fumonex Beads	lb.	.03 @	—
Gastex	lb.	.03 @	—
Kosmobile	lb.	.02925 @	—
Kosmobile 66	lb.	.02925 @	—
Micronex (Amarillo)	lb.	.02925 @	—
Micronex Beads (Amarillo)	lb.	.02925 @	—
Pelletex	lb.	.03 @	—
P-33	lb.	.0475 @	—
Supreme	lb.	.02925 @	—
Thermax	lb.	.02 @	—
Wyex	lb.	.02925 @	—

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85 @	24.50
Asbestine	ton	14.00 @	16.00
Barium carbonate (98-100%)	ton	47.00 @	49.00
Barytes	ton	22.85 @	31.50
Bentonite	ton	11.00 @	16.00
Blanc fixe, dry	ton	50.00 @	62.50
Calcene	ton	37.50 @	43.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white, extra lt.	ton	45.00 @	60.00
heavy	ton	45.00 @	55.00
Clay, Aerfloted, Suprex	ton	10.00 @	22.00
Crown (f.o.b. plant)	ton	10.00 @	—
Dixie	ton	10.00 @	22.50
Langford	ton	— @	7.50
McNamee	ton	10.00 @	22.50
Par	ton	10.00 @	22.50
Witco	ton	10.00 @	—
Cotton Flock (Dark)	lb.	.10½ @	.13
Kalite No. 1	ton	24.00 @	50.00
Kalite No. 3	ton	34.00 @	60.00
Kalvan	ton	95.00 @	121.00
Magnesium carbonate	lb.	.06¼ @	.09¾
Mica	ton	35.00 @	44.00
Mineralite	ton	— @	30.00
Pyrax A	ton	6.50 @	20.00
Rottenstone (powd. Dom.)	ton	25.50 @	37.50
Silene (calcium silicate)	lb.	.04 @	.045
Starch, powdered	cwt.	2.90 @	4.10
Talc, domestic	ton	17.00 @	25.00
Whiting, commercial	ton	16.00 @	26.00
Columbia Filler	ton	9.00 @	14.00
Witco	ton	6.00 @	—
Wood Flour	ton	24.00 @	25.00

MINERAL RUBBER

285°-300° Mineral Rubber	ton	23.00 @	42.00
Black Diamond	ton	25.00 @	—
Genasco, solid (factory)	ton	— @	—
Hard Hydrocarbon	ton	23.00 @	—
Parmr, solid	ton	— @	—
Pioneer, MR, solid	ton	— @	—

MISCELLANEOUS

Aromatics—Rodo #0	lb.	3.50 @	4.00
Rodo #10	lb.	4.50 @	5.00
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dors	lb.	4.50 @	—
Aresklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.35 @	.50
Darvan (dispersing agent)	lb.	.30 @	.39
Santomerse S (dispersing, wetting, penetrating and stabilizing agent)	lb.	.11 @	.25
Sponge Paste	lb.	— @	.18
Sunproof	lb.	.22 @	.27
Tackol (tackifier)	lb.	.085 @	.18
Tonox	lb.	.52 @	.61
Ty-Ply R (and S)	gal.	6.75 @	8.75
Unicel (blowing agent)	lb.	.50 @	—

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	2.23 @	2.48
Nitric, 36 degrees	cwt.	5.00 @	5.95
Acids, Fatty			
Laurex	lb.	.10½ @	.12¾
SL #10	lb.	.12 @	.14
Stearex Beads	lb.	.08 @	.09
Stearic, double pressed	lb.	.12½ @	.13½
Stearite	lb.	.08 @	—
Alkalies			
Caustic Soda, 76%	cwt.	2.30 @	3.53
Soda Ash, 58%	cwt.	1.10 @	2.93
Oils			
Cycline Oil	gal.	.14 @	.20
Degras, bbls.	lb.	.08 @	.08½
Fluxrite	lb.	.05½ @	.06½
Para-Flux	gal.	.08½ @	.18
Para-Lube	lb.	.425 @	.48
Petrolatum, amber	lb.	.02¾ @	.03¾
Pigmentaroil, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
Pine, steam distilled	gal.	.54 @	.59
Rosin Oil, cmpd.	gal.	.40 @	—
Rubberol	lb.	.13½ @	.14
Rubtack	lb.	.10 @	—
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	— @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.06 @	.06½
coal tar	ton	19.00 @	22.00
hardwood	ton	16.00 @	22.50
pine, 200 lb. gr. wt.	bbl.	6.00 @	6.50
Pigmentar, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
R. S. L. Resin	lb.	— @	—
Retort Pine Tar, drums	ton	20.00 @	26.00
Solvents			
Acetone, pure	lb.	.06 @	.08
Benzene, 90%, tank car	gal.	.14 @	—
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.25
Carbon, bisulfide	lb.	.05 @	.08½
Carbon tetrachloride	gal.	.66½ @	1.17
Dichlorethylene	lb.	— @	—
Dipentene, cml., drums	gal.	.38 @	.50
Ethylene dichloride	lb.	.07 @	.08
Plastogen	lb.	.07¾ @	.12
Reogen (drums)	lb.	.11½ @	.23
Rub-Sol	gal.	.09½ @	—
Trichlorethylene	lb.	.08 @	.09½
Turpentine, spirits	gal.	.44 @	.48
dest. dist., drums	gal.	.30 @	.35
Waxes			
Beeswax, white	lb.	.36½ @	.38½
Carnauba, yellow	lb.	.69 @	.70½
Ceresin, white, dom	lb.	.11½ @	—
Montan, crude	lb.	— @	—
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale, 122/124	lb.	.02¾ @	—
Refined, 123/125	lb.	.05¾ @	—

ANTI-OXIDANTS

Agerite Alba	lb.	2.00 @	2.15
Exel	lb.	1.00 @	1.02
Gel	lb.	.57 @	.59
Hipar	lb.	.65 @	.67
Powder	lb.	.52 @	.54
Resin	lb.	.52 @	.54
Resin D	lb.	.52 @	.54
White	lb.	1.25 @	1.60
Albasan	lb.	.70 @	.75
Antox	lb.	— @	.56
B-L-E	lb.	.52 @	.61
Flectol B	lb.	.52 @	.65
Flectol H	lb.	.52 @	.65
Flectol White	lb.	.90 @	1.15
Neozone A, B, C, D, E	lb.	.52 @	.63
Oxynone	lb.	.64 @	.80
Retardex	lb.	.45 @	.48
Santoflex B	lb.	.52 @	.65
Santovar A	lb.	1.15 @	1.40
S.C.R.	lb.	.33 @	.35
Stabilite	lb.	.52 @	.54
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.52 @	.61

MOLD LUBRICANTS

Aresklene	lb.	.35 @	.50
Cocoa Soapstock	lb.	.06 @	.08
Dipex	lb.	.06 @	.08
Lubrex	lb.	.25 @	.30
Mineralite	ton	— @	30.00
Mold Paste	lb.	.12 @	.18
Rubberol	lb.	.13½ @	.14
Sericite	ton	65.00 @	75.00
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.25 @	—
Amberex Type B	lb.	.18¾ @	—
Black	lb.	.08 @	.12
White	lb.	.08½ @	.13½
Brown	lb.	.08 @	.11½
Neophax A	lb.	.09 @	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.07½ @	.15
Sulfur Chloride, yellow (drs.)	lb.	.035 @	.04
Sulfur, rubber makers			
Refined (bags)	cwt.	2.35 @	—
Commercial (bags)	cwt.	2.00 @	—
Telloy	lb.	1.75 @	—
Vandex	lb.	1.75 @	—

STATISTICS

Crude Rubber — Latex & Guayule — Reclaim — Tires & Tubes — Automobiles — Rims — Gasoline — Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1937	574,600	237,307,041	18.44	7,902	3,385,433	19.02	566,698
1938	397,620	125,357,730	14.07	5,652	1,799,124	14.21	391,968
1939	469,803	167,558,245	15.92	13,125	5,832,618	19.84	456,678
1939:							
Oct.	42,784	15,211,621	15.87	5,886	2,881,172	21.85	36,898
Nov.	39,422	14,555,150	16.48	1,228	539,763	19.63	38,194
Dec.	68,384	25,861,354	16.88	1,116	529,759	21.20	67,268
1940:							
Jan.	68,962	26,314,500	17.03	955	447,673	20.92	68,007
Feb.	40,603	15,578,517	17.13	1,291	599,819	20.74	39,312
Mar.	55,517	21,845,290	17.57	975	447,460	20.49	54,542
April	66,622	26,176,442	17.54	565	252,638	19.98	66,057
May	47,559	18,511,955	17.38	821	301,914	16.41	46,738
June	51,074	20,019,581	17.50	623	295,334	21.15	50,451
July	66,931	26,426,632	17.63	100	49,828	22.20	66,831
Aug.	70,453	27,608,883	17.49	416	183,369	19.69	70,037
Sept.	75,770	29,317,540	17.27	666	349,443	23.43	75,104
Oct.	73,179	27,975,598	17.07	316	123,216	17.38	72,863
Nov.	69,844	26,917,136	17.21	126	52,020	18.45	69,718
Dec.	94,172	36,369,973	17.24	205	94,422	20.52	93,967

Note: "Gross Imports" do not include latex or guayule. To secure more accurate figures for "Net Imports" latex and guayule figures (shown below) should be added and the re-export figure deducted from the total. Annual figures for 1924-36 were revised in February, 1937.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule Tons	Guayule Dollars	Balata Tons	Balata Dollars	Jelutong Tons	Jelutong Dollars	Liquid Latex (1) Tons	Liquid Latex (1) Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	...	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1937	2,694	745,873	354	151,344	7,109	2,017,786	23,185	10,213,670
1938	2,485	623,819	509	181,140	9,132	2,944,504	11,878	4,147,318
1939	2,332	463,345	694	265,553	6,640	1,603,418	27,438	10,467,552
1939:								
Oct.	282	61,376	107	43,267	465	127,084	2,555	968,207
Nov.	214	46,558	96	37,858	289	74,358	3,071	1,227,788
Dec.	236	51,521	64	38,781	477	126,548	2,779	1,127,924
1940:								
Jan.	128	27,901	34	19,478	612	155,570	3,410	1,412,728
Feb.	314	70,251	55	26,420	461	134,878	2,171	947,524
Mar.	365	81,181	45	20,895	542	162,493	3,376	1,473,056
April	314	65,313	50	18,289	506	176,064	3,763	1,608,156
May	289	57,578	60	20,503	495	158,713	3,584	1,523,879
June	365	74,957	47	10,977	390	146,196	2,451	1,004,007
July	262	53,058	65	20,553	336	115,599	2,281	993,411
Aug.	297	59,464	61	22,638	701	276,642	2,278	1,022,531
Sept.	250	49,845	40	19,245	712	246,641	2,953	1,337,487
Oct.	381	77,286	70	38,092	1,150	382,168	1,156	512,153
Nov.	392	78,587	67	43,939	445	152,297	2,308	1,169,086
Dec.	278	62,586	54	39,471	1,102	341,876	3,534	1,539,957

(1) Weight given in pounds of dry rubber contained in latex.
Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Including Latex)

Figures on Monthly Basis

	1934	1935	1936	1937	1938	1939	1940	1941
Jan.	39,190	46,636	48,631	50,879	31,265	47,387	54,978	64,225
Feb.	40,515	42,720	36,841	51,950	25,357	43,422	49,832	
Mar.	47,003	42,153	42,813	54,129	32,389	51,416	50,192	
Apr.	44,853	44,247	52,031	51,859	29,730	45,268	50,103	
May	42,918	41,101	50,612	51,795	30,753	45,484	51,619	
June	40,147	36,156	52,772	51,860	32,540	48,438	46,506	
July	32,553	35,917	48,250	43,703	34,219	44,975	47,011	
Aug.	33,216	38,775	46,777	41,506	40,552	51,740	50,234	
Sept.	30,258	37,086	46,449	43,945	40,183	51,402	50,206	
Oct.	31,253	41,969	49,637	38,754	42,850	57,155	56,477	
Nov.	34,748	42,310	50,433	34,025	49,050	55,677	54,652	
Dec.	36,569	42,474	49,754	29,195	48,143	49,636	56,539	
Tot.	453,223	491,544	575,000	543,600	437,031	592,000	618,349	

Note: The above figures are based on the annual surveys conducted by the Leather and Rubber Division, Bureau of Foreign & Domestic Commerce, Washington, D. C., with the exception of those for the current year which are estimates made by the Rubber Manufacturers Association. They are revised frequently and the latest available issue should always be consulted for the most reliable figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption Tons	Consumption % to Crude	Stocks	Year	Production	Consumption Tons	Consumption % to Crude	Stocks
1931	129,690	123,000	35.1	21,714	1936	150,571	141,486	24.6	19,000
1932	75,656	77,500	23.3	16,334	1937	185,033	162,000	29.8	28,800
1933	93,587	85,000	21.2	17,780	1938	122,400	120,800	29.9	23,000
1934	108,162	100,855	22.3	20,000	1939	186,000	170,000	28.7	25,250
1935	122,948	117,523	23.9	17,000	1940	209,601	187,090	30.3	34,701

Figures on Monthly Basis

1940:									
Jan.	19,297	16,070	29.2	27,418	July	14,342	14,298	30.4	28,058
Feb.	17,992	15,370	30.8	28,603	Aug.	17,213	14,224	28.3	29,786
Mar.	17,234	15,931	31.7	28,488	Sep.	16,428	14 589	29.1	30,287
Apr.	16,568	16,298	32.5	27,558	Oct.	19,358	16,528	29.3	32,118
May	17,552	15,719	30.5	28,397	Nov.	17,689	16,042	29.4	33,143
June	16,631	14,912	32.1	29,260	Dec.	19,297	17,109	30.3	34,701
1941:									
Jan.	20,413	18,636	29.0	35,344	July	.....	.....	...	.....
Feb.	.....	.....	...	.....	Aug.	.....	.....	...	.....
Mar.	.....	.....	...	.....	Sept.	.....	.....	...	.....
Apr.	.....	.....	...	.....	Oct.	.....	.....	...	.....
May	.....	.....	...	.....	Nov.	.....	.....	...	.....
June	.....	.....	...	.....	Dec.	.....	.....	...	.....

Note: The above figures are based on the annual surveys conducted by the Leather and Rubber Division, Bureau of Foreign & Domestic Commerce, Washington, D. C., with the exception of those for the current year which are estimates made by the Rubber Manufacturers Association. They are revised frequently and the latest available issue should always be consulted for the most reliable figures. The annual figures are more accurate. Stocks shown are those on hand at the end of the indicated month or year.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1939*	1940	1941		1939*	1940	1941
January	38,089	40,370	.....	August	54,025	55,346	.....
February	34,928	37,557	.....	September	49,505	52,297	.....
March	43,042	44,607	.....	October	49,854	53,807	.....
April	44,264	47,683	.....	November	47,407	49,074	.....
May	49,766	52,946	.....	December	43,807	46,413	.....
June	50,133	55,459	.....				
July	50,689	53,865	.....	Total	555,509	589,424	.....

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1929	24,141,502	1933	8,713,962	1937	22,257,964
1930	17,364,096	1934	12,255,118	1938	10,612,138
1931	11,253,800	1935	18,664,107	1939	17,471,914
1932	6,261,336	1936	20,790,192	1940	19,378,558

1941		1941		1941	
January ...	2,032,121	May	.....	September .	.....
February ..	.....	June	.....	October ...	.....
March	.....	July	.....	November .	.....
April	.....	August	.....	December ..	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1938																																
Dec.	15⅜	15⅛	15⅜	—	15⅛	15⅜	16⅛	15⅜	15⅛	16	—	15⅛	15⅜	16	15⅛	16	16⅛	—	16¼	16⅜	16⅛	16⅜	16⅜	—	—	—	16⅜	16¼	16⅛	16¼	16⅛	16
1939																																
Jan.	—	15⅜	15⅜	16⅛	16	15⅛	16	15⅜	15⅛	16	—	15⅛	15⅜	16	15⅜	16	16⅛	15⅛	15⅜	15⅜	15⅜	16⅜	16⅜	15⅛	15⅜	14⅛	15⅛	15¼	15⅜	15⅜	15⅜
Feb.	—	15⅜	15⅜	16⅛	—	15⅛	16	15⅜	15⅛	16	—	15⅛	15⅜	16	15⅜	16	16⅛	15⅛	15⅜	15⅜	15⅜	16⅜	16⅜	15⅛	15⅜	—	16⅛	16⅛	—	—	—	16
March	—	16⅛	16⅛	16	—	15⅛	16⅛	15⅜	15⅛	16	—	15⅛	15⅜	16	15⅜	16	16⅛	15⅛	15⅜	15⅜	15⅜	16⅜	16⅜	15⅛	15⅜	—	16⅛	16⅛	—	—	—	16
April	—	15⅜	16⅛	16	—	15⅛	16⅛	15⅜	15⅛	16	—	15⅛	15⅜	16	15⅜	16	16⅛	15⅛	15⅜	15⅜	15⅜	16⅜	16⅜	15⅛	15⅜	—	16⅛	16⅛	—	—	—	16
May	—	15⅜	16	15⅛	16	15⅛	16⅛	15⅜	15⅛	16	—	15⅛	15⅜	16	15⅜	16⅛	16⅛	15⅛	15⅜	15⅜	15⅜	16⅜	16⅜	15⅛	15⅜	—	16⅛	16⅛	—	—	16½	16
June	—	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
July	—	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
August	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
September	—	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	—	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	—	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜
October	—	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	—	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	—	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛
November	—	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	—	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	—	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜
December	—	20	—	—	—	19⅜	19⅜	19⅜	19⅜	20⅜	—	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	—	20⅜	19⅜	20	—	—	20
1940																																
January	—	19⅜	19⅜	19⅜	19⅜	19⅜	—	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	—	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜
February	—	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	—	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜
March	—	18⅛	18⅜	18½	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	—	18⅜	18⅜	18¾	19⅜	18⅜	19⅜	19⅜	18⅜	18⅜	18⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	18⅜	18⅜	18⅜	19⅜
April	—	18⅜	18⅜	18½	18⅜	18⅜	18⅜	18⅜	19	18⅜	—	18⅜	18⅜	19⅜	23½	23¼	22½	22⅜	22⅜	22⅜	22⅜	22⅜	22⅜	22⅜	22⅜	22⅜	22⅜	22⅜	22⅜	22⅜	22⅜	22⅜
May	—	19⅜	20⅜	20⅜	21⅜	21⅜	20	20½	20⅜	24	23½	23¼	23¼	22¾	22½	22¼	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾
June	—	22	21⅜	21⅜	20½	21⅜	21⅜	21⅜	20⅜	22½	23½	22¾	22¾	22¾	20½	20¼	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
July	—	21⅜	21⅜	21⅜	21⅜	19⅜	19⅜	19⅜	19⅜	20½	20⅜	20⅜	20⅜	20⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜
August	—	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜
September	—	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜
October	—	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜
November	—	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜
December	—	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜
1941																																
January	—	20⅜	20½	20½	—	20½	20⅜	20⅜	20¼	20⅜	—	20⅜	20⅜	—	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜	19½	19⅜	19⅜	19⅜	19⅜
February	—	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜
March	—	20⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	21⅜	20⅜	20⅜	20⅜	20⅜	20⅜	20⅜

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Markets)

Average Price per Pound for Years 1913-1932

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1914	65.33	1918	60.15	1922	17.50	1926	48.50	1930	11.98
1915	65.85	1919	48.70	1923	29.45	1927	37.72	1931	6.17
1916	72.50	1920	36.30	1924	26.20	1928	22.48	1932	3.48
1917	72.23	1921	16.36	1925	72.46	1929	20.59	1933	5.96

Average Monthly Price per Pound Since 1933

	1934 Cents	1935 Cents	1936 Cents	1937 Cents	1938 Cents	1939 Cents	1940 Cents	1941 Cents
Jan.	9.32	13.10	14.35	21.37	14.63	15.75	19.06	19.88
Feb.	10.45	12.92	15.48	21.33	14.71	15.93	18.83	20.43
Mar.	11.01	11.51	15.89	24.09	13.55	16.26	18.58	
Apr.	12.10	11.55	15.98	23.44	11.84	15.87	19.16	
May	13.26	12.05	15.62	21.14	11.57	16.07	21.21	
June	13.51	12.57	15.85	19.29	12.57	16.37	22.20	
July	14.60	12.10	16.49	18.86	15.37	16.51	21.12	
Aug.	15.47	11.98	16.25	18.37	16.08	16.67	19.62	
Sept.	15.36	11.55	16.46	18.55	16.15	21.24	19.28	
Oct.	13.96	12.62	16.55	16.28	16.89	19.89	20.33	
Nov.	13.04	13.15	17.97	14.60	16.24	20.21	21.04	
Dec.	12.98	13.28	20.01	15.41	16.05	20.01	20.76	
Average for Year	12.92	12.37	16.41	19.39	14.64	17.57	20.10	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1940 Dec.	1941 Jan.	1941 Feb.	1941 Mar.	Day	1940 Dec.	1941 Jan.	1941 Feb.	1941 Mar.
1	——	——	——	——	17	11 1/8	12 1/16	12 1/8	
2	11 3/4	12 1/16	——	——	18	12	——	12 7/8	
3	11 1/8	12 3/16	12 1/16	13 1/16	19	12	——	13	
4	11 3/8	——	12 1/16	13 1/16	20	11 1/8	12 3/8	12 1/8	
5	11 3/8	——	12 1/16	13 3/4	21	——	12 1/16	13	
6	11 7/8	12 3/16	12 1/16	13 5/8	22	——	12 3/8	——	
7	——	12 1/2	12 1/16	13 5/8	23	11 1/8	12 3/8	——	
8	——	12 1/2	——	——	24	12	12 7/16	13 1/16	
9	11 3/4	12 7/16	——	——	25	——	——	13 1/16	
10	11 1/8	12 7/16	12 7/16	13 5/8	26	——	——	13 1/8	
11	12	——	12 1/2	——	27	12	12 1/2	13 1/8	
12	12	——	12 1/2	——	28	——	12 1/2	13 1/4	
13	12 1/16	12 7/16	12 1/2	——	29	——	12 1/2	——	
14	——	12 3/8	12 1/8	——	30	12 1/8	12 1/2	——	
15	——	12 3/8	——	——	31	12 1/8	12 1/16	——	
16	12 1/16	12 1/4	——	——					

Average Monthly Price Per Pound

Month	1938 Pence	1939 Pence	1940 Pence	1941 Pence	Month	1938 Pence	1939 Pence	1940 Pence	1941 Pence
Jan.	7.077	7.926	11.793	12.415	Aug.	7.841	8.545	12.818	
Feb.	7.029	7.942	12.577	12.769	Sept.	7.918	9.634	11.964	
Mar.	6.590	8.120	11.651		Oct.	8.355	10.177	11.813	
Apr.	5.793	7.910	10.980		Nov.	8.111	11.210	11.801	
May	5.632	8.002	11.600		Dec.	8.005	11.559	11.963	
June	6.147	8.216	13.046		Average for Year.	7.164	8.959	12.035	
July	7.464	8.271	12.410						

Note: No quotations were made in the London market from June 17 through June 30. Accordingly, the average for the month is based on the first eleven trading days only.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1941 Jan.	1941 Feb.	1941 Mar.	Date	1941 Jan.	1941 Feb.	1941 Mar.	Date	1941 Jan.	1941 Feb.	1941 Mar.
1	——	10.90	10.90	11	10.59	10.91		22	10.69	——	
2	10.42	——	——	12	——	——		23	10.85	——	
3	10.43	10.91	10.83	13	10.53	10.87		24	10.94	10.90	
4	10.41	10.87	10.79	14	10.45	10.77		25	10.89	10.97	
5	——	10.86	10.81	15	10.51	10.69		26	——	10.91	
6	10.58	10.91	10.82	16	10.60	——		27	10.87	10.90	
7	10.60	10.89	10.87	17	10.62	10.70		28	10.88	10.94	
8	10.62	10.92	10.88	18	10.59	10.76		29	10.80	——	
9	10.61	——	——	19	——	10.80		30	10.86	——	
10	10.63	10.94	11.11	20	10.57	10.93		31	10.92	——	
				21	10.57	10.86					

Average Monthly Price Per Pound

	1938 Cents	1939 Cents	1940 Cents	1941 Cents		1938 Cents	1939 Cents	1940 Cents	1941 Cents
Jan.	8.57	8.94	11.19	10.66	Aug.	8.41	9.30	9.84	
Feb.	8.91	8.97	11.10	10.87	Sept.	8.17	9.30	9.69	
Mar.	8.92	9.00	10.90		Oct.	8.61	9.24	9.62	
Apr.	8.76	8.87	10.89		Nov.	9.08	9.73	9.97	
May	8.50	9.56	10.33		Dec.	8.72	10.97	10.18	
June	8.38	9.88	10.72		Average for Year	8.66	9.46	10.40	
July	8.85	9.71	10.42						

Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

End of	ON HAND 1939	1940	1941	AFLOAT 1939	1940	1941	TOTAL 1939	1940	1941
Jan.	220,727	142,368	340,857	48,210	90,285	153,169	268,937	232,653	494,026
Feb.	207,882	134,328		55,814	112,257		263,696	246,585	
Mar.	201,752	142,414		55,981	113,619		257,733	256,033	
Apr.	188,074	162,459		57,918	102,557		245,992	265,016	
May	187,980	161,446		54,046	109,364		242,026	270,810	
June	173,493	168,235		51,274	119,138		224,767	287,373	
July	165,450	190,222		52,990	139,629		218,440	329,851	
Aug.	152,029	213,002		66,717	141,286		218,746	354,288	
Sept.	136,824	241,358		68,310	137,033		205,134	378,391	
Oct.	119,404	259,140		100,500	166,837		219,904	425,977	
Nov.	105,205	276,943		114,044	158,095		219,249	435,038	
Dec.	125,800	318,486		91,095	145,950		216,895	464,436	

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1938	1939	1940	Liverpool 1938	1939	1940
January	40,203	51,420	12,000*	21,711	28,789	8,000*
February	46,596	48,312	10,000*	24,737	26,784	7,000*
March	50,233	46,768	10,000*	26,220	24,996	8,000*
April	54,296	44,760	12,000*	28,277	23,742	10,000*
May	57,194	43,454	12,000*	29,862	22,211	9,000*
June	60,307	42,374	11,000*	31,837	21,176	8,500*
July	62,236	37,772	15,500*	32,825	19,116	11,000*
August	65,113	28,363	20,000*	34,315	16,218	16,000*
September	63,321	24,965*		34,645	14,054*	
October	59,609	23,685*		33,483	13,336*	
November	57,794	23,244*		32,116	13,087*	
December	55,668	19,545*		31,012	11,006*	

* Estimated.

(Figures up to August, 1939, from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [2]	Holland	Para and Manaos
At end of 1939					
October	25,376*	46,264	3,335	...	3,419
November	22,957*	45,133	5,289	...	4,510
December	15,299*	54,868	5,149	...	5,336
At end of 1940					
January	35,938	60,504	5,755	....	2,862
February	33,563*	52,615	4,452	....	2,869
March	23,830*	48,180	3,369	....	3,246
April	42,239	50,656	4,749	....	2,715
May	32,731*	45,715	3,774	....	1,743
June	32,375*	45,618	5,057	....	1,706
July	36,716*	43,850	4,392	....	1,667
August	40,395*	39,950	4,460	....	1,580
September	29,069	44,730	3,549	....	2,559
October	33,638	42,239	4,060	....	3,084
November	33,778	43,693	6,258	....	....

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only. * Revised.

RUBBER STOCKS AFLOAT

	Afloat for United States	Afloat for Europe	All Other Afloat	Total Afloat
End of: 1940				
January	90,285	40,000	44,715	175,000
February	112,257	40,000	40,743	193,000
March	113,619	45,000	52,381	211,000
April	102,557	45,000	40,443	188,000
May	109,364	45,000	55,636	210,000
June	119,138	50,000	65,862	235,000
July	139,629	55,000	55,371	250,000
August	141,286	55,000	53,714	255,000
September	137,033	60,000	67,967	265,000
October	166,837	60,000	38,163	265,000
November	158,095	60,000	31,905	250,000
December	145,950	.....	.....	.....
End of: 1941				
January	153,169	.....	.....	.....

Note: *Total Afloat* figures are estimated at 1½ months' world shipments by the International Rubber Regulation Committee. *Afloat for U. S.* is supplied by the Rubber Manufacturers Association. *Afloat for Europe* is estimated. *All Other Afloat* is determined by subtraction.

TOTAL PRINCIPAL WORLD STOCKS

(Figures from the Survey of Current Business)

At End of:	1935	1936	1937*	1938*	1939	1940
January	698,153	600,479	454,249	549,762	497,665	433,841
February	686,195	599,355	445,265	565,833	479,578	429,551
March	678,809	583,318	447,856	586,666	460,723	447,472
April	677,006	567,172	428,249	586,291	438,252	465,345
May	677,569	541,871	413,134	568,158	429,979	470,981
June	671,525	520,255	434,250	573,136	407,640	500,774
July	679,061	519,074	445,782	580,654	418,639	547,708
August	680,644	500,520	457,462	565,394	397,345	579,119
September	661,509	493,585	470,768	551,447	396,867	631,888
October	655,000	486,159	479,398	540,976	413,274	.....
November	617,300	466,491	493,266	512,196	395,217	.....
December	613,987	466,576	545,533	482,852	391,125	.....
Monthly Avge.	666,397	528,738	460,022	555,280	427,192	.....

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Production Figures on Quarterly Basis

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,635	13,437	13,355	11,376	15,565	7,314	13,946	14,849
Apr.-June	14,412	13,565	12,597	14,892	15,834	7,380	13,759	15,711
July-Sept.	14,707	9,822	11,312	14,914	12,207	10,794	15,182	13,875
Oct.-Dec.	9,550	10,406	12,099	14,858	9,704	12,360	14,726	14,919
Total	45,304	47,230	49,363	56,040	53,310	37,848	57,613	59,354

Shipment Figures on Quarterly Basis

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,981	10,730	11,154	10,554	14,143	7,388	12,445	12,728
Apr.-June	15,139	14,998	13,473	15,940	15,741	9,564	15,107	17,657
July-Sept.	13,707	11,648	13,489	14,037	13,106	11,243	15,791	13,101
Oct.-Dec.	8,265	9,310	12,066	12,855	10,495	12,098	14,165	15,670
Total	44,092	46,686	50,182	53,386	53,485	40,293	57,508	59,156

Inventory Figures [2]

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	7,290	11,651	11,675	8,762	12,004	10,547	9,963	10,747
Apr.-June	6,615	10,219	10,755	7,556	12,081	8,337	8,632	8,881
July-Sept.	7,595	8,419	8,288	8,690	11,200	7,859	8,080	9,890
Oct.-Dec.	8,888	9,455	8,196	10,717	10,383	8,166	8,665	9,179

Figures for Recent Months

	PRODUCTION 1939	1940	1941	SHIPMENTS 1939	1940	1941	INVENTORY [2] 1939	1940	1941
Jan.	4,546	4,954	5,472	4,149	4,270	4,847	8,863	9,348	9,797
Feb.	4,309	4,888	....	3,731	4,112	....	9,475	10,124	....
Mar.	5,091	5,007	....	4,565	4,346	....	9,963	10,747	....

AUTOMOBILE INNER TUBES

Production Figures on Quarterly Basis

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,230	12,823	12,553	11,891	15,831	7,314	12,383	12,815
Apr.-June	13,001	13,191	11,631	14,624	15,413	7,380	11,847	13,744
July-Sept.	14,356	10,321	11,270	15,320	12,038	10,794	13,118	12,469
Oct.-Dec.	9,000	9,891	12,425	15,201	9,092	12,360	13,300	13,333
Total	42,587	46,226	47,879	57,036	52,374	37,848	50,648	52,361

Shipment Figures on Quarterly Basis

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,539	10,640	11,252	11,367	14,606	7,387	11,422	11,684
Apr.-June	13,292	14,553	11,928	15,113	15,495	9,564	13,010	15,003
July-Sept.	13,370	11,545	13,251	15,069	12,901	11,243	13,449	11,403
Oct.-Dec.	8,189	8,306	11,636	12,874	9,765	12,099	13,309	14,216
Total	41,390	45,044	48,067	54,423	52,767	40,293	51,190	52,306

Inventory Figures [2]

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,369	10,244	10,406	8,660	11,993	10,547	8,752	8,247
Apr.-June	6,097	8,795	10,050	8,075	11,833	8,337	7,549	6,841
July-Sept.	7,008	7,639	7,565	8,595	11,326	7,859	7,206	7,950
Oct.-Dec.	7,815	9,180	8,231	10,945	10,312	8,166	7,036	7,014

Figures for Recent Months

	PRODUCTION 1939	1940	1941	SHIPMENTS 1939	1940	1941	INVENTORY [2] 1939	1940	1941
Jan.	4,097	4,260	5,168	3,943	3,805	4,527	7,932	7,490	7,733
Feb.	3,795	4,184	....	3,401	3,788	....	8,298	7,886	....
Mar.	4,492	4,371	....	4,078	4,091	....	8,752	8,247	....

[1] These figures are based on reports received from the Rubber Manufacturers Association. They are revised frequently and the latest available issue should be consulted for most reliable figures.

[2] Stocks held by manufacturers at end of period indicated.

Automobile Production

Year	United States Total	Passenger Cars	Trucks	Canada Total	Passenger Cars	Trucks	Grand Total
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1937	4,808,974	3,915,889	893,085	207,463	153,046	54,417	5,016,437
1938	2,489,085	2,000,985	488,100	166,086	123,761	42,325	2,655,171
1939*	3,577,292	2,866,796	710,496	155,426	108,369	47,057	3,732,718
1940	4,469,354	3,692,328	777,026	222,984	110,126	112,858	4,692,338
1940							
July	231,703	168,769	62,934	14,468	3,397	11,071	246,171
August	75,873	46,823	29,050	13,993	1,510	12,483	89,866
September	269,108	224,470	44,638	15,475	3,410	12,065	284,583
Oct.	493,223	421,214	72,009	21,151	7,056	14,095	514,374
Nov.	487,352	407,091	80,261	23,621	10,814	12,807	510,973
Dec.	483,567	396,531	87,036	23,364	11,653	11,711	506,931
1941							
Jan.	500,931	411,258	89,673	23,195	11,990	11,205	524,126
Feb.	.....	.....	.....	.....	.....	.....	.....
Mar.	.....	.....	.....	.....	.....	.....	.....

* Revised.

Note: U. S. figures represent factory sales; Canadian, production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA							NETHERLAND INDIES						
	Gross Exports	Imports	Net Exports	Ceylon	India & Burma	Sarawak	British North Borneo	Thailand	Java & Madura	Sumatra E. Coast	Other N.I.	Indo-China	Amazon Valley	All Other	World Total
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,638	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,536
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,292	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1937	681,638	213,446	468,192	70,353	17,015	25,922	13,213	5,551	84,085	139,632	207,863	43,399	15,576	13,063	1,133,864
1938	526,911	156,101	370,810	49,528	15,178	17,792	9,512	41,080	57,526	94,501	145,909	58,518	14,618	12,920	887,892
1939	553,324	177,851	375,473	61,026	15,881	24,014	11,864	41,266	72,786	117,791	181,272	65,140	13,892	22,224	1,002,629

1940:	British Malaya [1]	N.E.I.	Ceylon [2]	India & Burma [2]	North Borneo	Sarawak	Thailand	Indo-China	Oceania	Africa [3]	Liberia	South America	Mexico (Guayule)	Grand Total
Jan.	26,229	54,148	7,698	1,672	1,858	2,256	5,722	5,238	185	747	1,191	1,550	389	108,883
Feb.	45,651	37,958	8,946	2,922	1,164	2,678	4,307	6,931	94	834	477	1,662	239	113,863
March	47,885	42,355	5,305	1,941	1,050	3,526	3,111	3,551	178	943	548	1,482	346	112,221
April	25,454	44,416	4,144	1,807	1,799	2,951	1,834	2,927	203	720	598	1,159	317	88,329
May	57,874	40,436	7,337	2,018	1,370	2,696	2,582	4,578	195	961	364	2,305	331	123,047
June	45,471	44,834	5,603	1,553	1,421	4,077	2,178	2,730	168	727	405	1,080	101	110,348
July	42,861	60,482	7,330	1,194	1,767	2,494	4,253	4,045	169	800	342	1,035	443	127,215
Aug.	45,872	45,078	8,139	1,332	1,593	2,640	4,545	7,337	285	800	308	1,233	327	120,729
Sept.	58,892	44,009	9,985	1,319	1,743	2,404	3,247	9,303	100	800	323	1,295	200	133,715
Oct.	52,767	50,139	8,127	1,841	1,693	2,564	3,355	2,082	200	800	600	1,860	200	126,228
Nov.	36,045	37,387	5,623	2,626	1,130	3,360	3,463	6,715	200	800	600	1,500	200	99,649
Dec.	.....	.....	.....	.....	.....	.....	....	....	...	...	...	....	...	.....

(1) Including Brunei and Labuan; figures shown represent rubber which has actually been shipped and include rubber from the free stocks in Singapore and Penang. (2) Exports of domestic produce. (3) Exclusive of Liberia. Notes: Figures shown prior to 1940 were furnished by the United States Department of Commerce. Figures since 1940 were furnished by the International Rubber Regulation Committee, which accounts for the difference in the principal producing countries shown. Many figures for current months are provisional only and are later revised when more definite statistics are available. Therefore, it is suggested that figures from the most recent issue should be taken as more reliable.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,773	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,290	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,391	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	37,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	16,534	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,510
1937	592,394	92,707	59,871	98,170	36,088	62,311	24,733	30,462	19,164	14,970	4,343	4,680	2,400	13,063	1,055,356
1938	406,343	133,079	59,660	90,200	25,696	45,836	28,170	25,650	11,944	11,309	5,092	16,034	2,400	9,936	871,349
1939	486,348				31,615	42,352			15,426	9,612	7,051				
1939:															
May	45,390	7,531	4,646	8,413	3,006	4,438	1,573	2,000*	1,188	792	518	1,654	200*	618	81,967
June	33,951	8,439	4,649	8,190	2,423	3,067	1,992	2,000*	1,308	621	672	2,703	200*	487	70,702
July	36,932	4,040	4,282	8,437	3,164	3,668	1,408	1,000*	1,422	859	565	824	200*	412	67,155
Aug.	38,319	2,044	4,000*	....	2,033	3,145	1,500*	2,000*	2,182	952	651	1,546	200*	400*	58,972
Sept.	36,197	4,406	4,000*	....	2,639	9,254	1,500*	2,000*	875	108	222	1,200*	200*	...	62,601
Oct.	39,735	8,530	5,000*	....	5,787	2,749	1,500*	2,000*	1,235	519	653	1,200*	200*	...	69,108
Nov.	41,478	10,500*	5,000*	....	1,709	5,104	1,500*	2,000*	1,200*	667	613	1,200*	200*	...	71,171
Dec.	70,302	5,200*	5,000*	....	3,025	3,961	1,500*	2,000*	1,200*	1,035	1,827	1,200*	200*	...	96,450
1940:															
Jan.	71,565	450	5,000*	....	5,047	4,540	1,500*	2,000*	1,921	891	682	1,200*	200*	....	....
Feb.	41,797	7,500	5,000*	....	3,508	5,241	1,500*	2,000*	1,846	694	495	1,200*	200*	....	....
Mar.	58,302	14,200	5,000*	....	3,062	6,057	1,500*	2,000*	1,784	....	627	1,200*	200*	....	....
Apr.	70,135	16,400	5,000*	....	3,096	2,000*	1,500*	2,000*	1,612	....	....	1,200*	200*	....	....
May	50,610	10,000	5,000*	....	3,108	2,500*	1,500*	2,000*	2,128	....	....	1,200*	200*	....	....
June	53,266	9,500	5,000*	....	1,062	3,000*	1,500*	2,000*	1,181	....	....	1,200*	200*	....	....
July	69,496	19,500	5,000*	....	5,112	3,000*	1,500*	2,000*	1,902	....	....	1,200*	200*	....	....
Aug.	72,612	21,250	5,000*	....	4,605	4,500*	1,500*	2,000*	2,508	....	....	1,200*	200*	....	....
Sept.	78,306	25,940	5,000*	....	2,743	....	1,500*	2,000*	2,485	....	....	1,200*	200*	....	....
Oct.	74,400	.....	5,000*	....	....	....	1,500*	2,000*	1,590	....	....	1,200*	200*	....	....
Nov.	72,775	.....	5,000*	....	....	....	1,500*	2,000*	1,200*	....	....	1,200*	200*	....	....
Dec.	.....	.....	....	....	....	....	....	....	....	....	....	....	....	....	....

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]—United States imports of guayule are included in this compilation. *—Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE: THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

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The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York, N. Y.

Chemicals and Compounding Materials —

ACCELERATORS—
El-Sixty; Ureka; Ureka C; Guantal; Santocure; Pipsolene; RN-2 Crystals; DPG; Pip Pip; A-32; A-100; R-2 Crystals; A-10 • ANTIOXIDANTS —Flectols B, H, White; Santoflex B; Santovar A.
MONSANTO CHEMICAL CO.
Rubber Service Division
1012 Second National Bldg., Akron, Ohio

CARBON BLACK
CONTINENTAL
The Newest Name in Carbon Black offers
CONTINENTAL DUSTLESS
CONTINENTAL COMPRESSED
CONTINENTAL UNCOMPRESSED
Continental Carbon Company
295 Madison Ave., New York, N.Y.

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For Rubber		For Industry Generally
Accelerators	*Acids*	*Latex*
Antioxidants	*Oil of Myrbane*	*Lotol*
Specialties	*Aniline Oil*	*Dispersions*

NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 SIXTH AVE. NEW YORK

AERO BRAND
RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
American Cyanamid & Chemical Corporation
30 Rockefeller Plaza, New York, N. Y.

CARBON BLACK— *Aerfloted*
Arrow Black for rubber compounding. Standard for grit-free uniformity.
J. M. Huber, Inc.
460 West 34th St. New York

CHEMICALS AND MINERAL
Ingredients—Whiting, Clay, Talc, Barytes, Colors. Heavy Calsined Magnesia. Carbonate of Magnesia, Pumice Stone.
Standard Since 1890
Whittaker, Clark & Daniels, Inc.
260 West Broadway New York

ALUMINUM FLAKE
A uniform, fine, low gravity, white reinforcing pigment. *Furnished to the rubber trade for 38 years.*
The Aluminum Flake Co.
Akron, Ohio

CARBON BLACK
DIXIE...KOSMOS
Used throughout the world
UNITED CARBON COMPANY
Charleston, W. Va.
New York • Akron • Chicago

COAL TAR CHEMICALS
Coumarone Resins — Tack Producers
Resinous Oils — Dispersing Oils
Reclaiming Oils — Softeners
Solvents
The Neville Company
Neville Island, Pittsburgh, Penna.

ANTIMONY Pentasulphide, golden and crimson, very fine, pure.
Rare Metal Products Co.
Belleville, N. J.
Direct Factory Representation

CARBON BLACK
WITCO DISPERSO
and DUSTLESS and a
Complete Line of High Quality
Rubber Chemicals
Wishnick-Tumpeer, Inc.
295 Madison Ave., New York, N.Y.

COLLOIDAL SULPHUR
COLLOIDAL ZINC OXIDE
COLLOIDAL COLORS
HEVEATEX CORPORATION
78 Goodyear Ave. Melrose, Mass.
Offices in New York, Akron, Chicago

ASBESTINE— Specially prepared for use in Rubber. Send for liberal working samples.
SOLE PRODUCERS
International Pulp Co.
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CATALPO—The universal and standard rubber pigment now being used in treads, solids, tubes, carcass frictions, etc.
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COLORS
Harmon Organic Rubber Color Granules are bright in shade and fast in cure. *Easy to weigh—Easy to disperse —Economical—Will not dust or fly.*
Harmon Color Works, Inc.
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Accelerators—Sulphur
Stocks Carried At All Times
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BRILLIANT ORGANIC DYES; PERMANENT, NON-BLEEDING, LOW COST
For All Cures
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the world's standard gas black, universally known as the "King of Rubber Pigments."
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THE MARKET PLACE
for Results

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Vulcanizing Agents	Pigments
Accelerators	Clays
Antioxidants	Mineral Rubber
Plasticizers	Aromatics
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230 Park Ave. New York City

The Market Place

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An Approved Clay for Rubber Compounding
Southeastern Clay Co.
Aiken South Carolina

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"MARINCO" Magnesium Carbonates, Hydroxides, Oxides
U.S.P. Technical and Special Grades
Marine Magnesium Products Corporation
South San Francisco, California

STEARIC ACID
STEAREX . . . CAKE or POWDER
STEAREX BEAD
Standardized Products for Rubber Compounding
MINERAL RUBBER (Parmr), TALC
SOAPSTONE
Binney & Smith Co.
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CUMAR — Paracumarone Resin.
A neutral gum for rubber compounding.
Samples and prices on request.
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Pure Oxides of Iron
Yellows—Reds—Browns—Black
MAGNETIC PIGMENT CO.
Manufacturers
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Distributors
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SULPHURS
Rubbermakers' TIRE BRAND and TUBE BRAND. Also CRYSTEX Insoluble Sulphur, Sulphur Chloride, Caustic Soda, Carbon Bi-Sulphide, Carbon Tetra-Chloride.
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DU PONT Rubber Chemicals
DU PONT RUBBER COLORS
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DU PONT ANTI-OXIDANTS
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RUBBER CHEMICALS DIVISION
WILMINGTON, DELAWARE

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overcome odors in rubber—effectively and at low cost.
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TITANOX-A (Titanium Dioxide)
TITANOX-B (Titanium Barium Pigment)
TITANOX-C (Titanium Calcium Pigment)
TITANOX-L (Lead Titanate)
TITANIUM PIGMENT CORP.
SELLING AGENTS
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The Universal Softener—Adaptable, Uniform. Improves Quality—Economical.
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ZINC OXIDES
AZO ZZZ Zinc Oxides
lead free—pure—uniform—dependable
AZO ZZZ-11 AZO ZZZ-55
AZO ZZZ-22 AZO ZZZ-44 AZO ZZZ-66
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—A cool mixing reinforcing black for Footwear and Mechanicals. Good ageing —Improved oil resistance.
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PELLETEX (The pellet *Gastex*)
The special process reinforcing black in free-flowing form. Saves power; none wasted; protects adjacent colored stocks.
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GASTEX
Special Process Reinforcing BLACK. Superior aging and oil resistant properties. Low permanent set.
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For outstanding compatability in processing natural or modern synthetic rubbers, use
SUN RUBBER PROCESSING OILS
Write
SUN OIL COMPANY
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Black Label Red Label Green Label
Manufactured by Our New Electrothermic Process
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SPAN grinding mill reduces soft and hard rubber to fine powder.
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ROSS Improved Mixers for cutting rubber cements. Standard Mixers, 50-500 gallons; Change Can Mixers, 5-50 gallons.
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High Grade PLANTATION RUBBER from our own Estates

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Normal, Concentrated, Processed

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There is no better source for Latex

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Division of United States Rubber Co.
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Warehouses at Akron and E. St. Louis

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High Temperature Resistant for adhesion of rubber or synthetic rubber to metal or other materials.
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